Y'awl Come On Down . . .

to Dallas for the 1977 National Computer Conference at the Dallas Convention Center next week.

The center (left) will house 1,142 booths from over 350 exhibiting companies displaying a gamut of products from microprocessors to mainframes — with minis, peripherals, software, communications gear, supplies and terminals wedged in between.

The largest computer exhibit ever in the U.S. will also include 78 more booths in a special section for the Personal Computing Fair, held in conjunction with NCC.

The American Federation of Information Processing Societies (Afips), which hosts the yearly event, expects 25,000 to 30,000 data processing personnel to crowd into the exhibit hall. They will also partake of a technical program consisting of 89 sessions ranging from the esoteric aspects of computer science through hints on how to deal with people to practical applications of computers in business.

In addition, there will be 11 "Professional Seminars," conducted primarily by vendors, covering such subjects as data base management systems, microprocessors, structured design and the development of long-range DP plans.

Three plenary sessions will also be included in the program, highlighted by a keynote address by Mark Shepherd Jr., chairman of the board at Texas Instruments, Inc., the Afips presidential address by Dr. Theodore J. Williams, and an industry plenary address by A. Douglas Murch, a senior vice-president at Prudential Insurance Co. of America.

This is *Computerworld*'s NCC Preview Issue and a report on the week's events follows Page 52.

NEWSPAPER

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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Ambitious EFT: Quintet of Banks, Quartet of Vendors

By Toni Wiseman
Of the CW Staff

BALTIMORE — Maryland Switch, Inc., a bank services corporation jointly owned by five Maryland banks, has started an ambitious pilot electronic funds transfer (EFT) switch operation supporting a network of multivendor terminals.

The banks participating in the project include Equitable Trust Co., First National Bank of Maryland, Maryland National Bank, Suburban Trust Co. and Union Trust Co. of Maryland.

Transactions generated by a bank customer are routed from the terminals at retail locations via the switch to the data base of the participating banks or to Service Center, Inc., a charge card processing center operating on behalf of several of the banks.

Maryland Switch is operating an IBM 370/145 with a Periphonics, Inc. front end. The network currently supports four types of terminals — Amcat, AT&T's Transaction Telephone Model 1, Burroughs' TT 602 and IBM's 3606 or 3608.

The terminals have been selected by the banks that will be marketing them and the variety is by no means limited to these four, according to Roger T. Abouchar, vice-president of Kranzley & Co., which helped develop the system.

Data is transmitted from the terminals to the switch's computer primarily over dial-up phone lines and over 2,400 bit/sec leased lines from the switch to the banks' computers, Charles Shaab of Service Center, Inc. said.

Response time has averaged 8 sec per transaction including transmissions to/from California for all out-of-state authorizations, he said, noting this was satisfactory.

During the pilot, only credit authorization and check verification transactions are being handled, but the banks will eventually offer a wide range of services including credit card transactions for BankAmericard and Master Charge, local

(Continued on Page 6)

Anticompetitive Partnership?

U.S. Probing SBS for Antitrust Offenses

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. — The Justice Department has launched an investigation into Satellite Business Systems (SBS) for possible antitrust violations.

Civil Investigative Demands (CID) have been served on SBS and the partners that own it — IBM, Communications Satellite Corp. (Comsat), Comsat General Corp., Aetna Life and Casualty Co. and Aetna Casualty and Surety Co.

"We have a civil antitrust investigation going on into the [SBS] joint venture to see whether there might have been violations of Section 1 of the Sherman Act or Section 7 of the Clayton Act," a Justice spokesman said last week.

Section 1 of the Sherman Act prohibits any combination, contract or conspiracy in restraint of trade, such as price fixing agreements not to compete and agreements to carve up markets. The Clayton Act prohibits anticompetitive mergers that would serve to substantially lessen competition.

A joint venture such as SBS may be considered anticompetitive if it is determined that a partner could have done it individually or with just one other partner, the Justice Department spokesman explained.

A CID was described as similar to a subpoena which is authorized under federal statutes in civil antitrust investigations. If the responses to the CIDs "develop sufficient evidence" that antitrust laws have been violated, then an antitrust suit could follow, the spokesman said.

The CIDs request documentary materials dating back to 1966 related to the establishment of SBS and the acquisition of the assets of the predecessor organizations. The SBS partnership is an outgrowth of the

(Continued on Page 2)

Study Says Users Should Pursue Critical Errors, Cope With Rest

By Frank Vaughan
Of the CW Staff

NORTHRIDGE, Calif. — Since error detection and correction is so costly, users should not strive for perfection but rather pursue the "critical errors and be prepared to live with the rest."

This thesis was expressed recently by Robert L. Patrick in a study commissioned by the National Bureau of Standards (NBS).

The study, which may or may not be accepted and published by the NBS, is entitled "Dynamic Performance Assurance Study: In-Process Detection and Correction of Errors in Computer Information Systems."

Dynamic performance assurance, according to the author, is the result of "a hierarchical set of provisions built into a computer system in an attempt to guarantee that the entire system performs properly or that prompt corrective action is initiated."

By entire system, the author indicated he meant hardware, software, applications programs as well as manual procedures.

The focus of the study was narrowed to techniques that can be adopted without rewiring the computer or recoding the operating systems, Patrick said.

There are four stages of assurance, according to the study.

The foundation of all such assurance lies in the architecture of the computer hardware, specifically the checking that is built into each box and how those checking features are integrated into a checking subsystem.

The second stage is software. What does it do with hardware error signals, and what

(Continued on Page 6)

Xerox Printer Uses Plain Paper, Outputs Two Pages Per Second

NEW YORK — An electronic xerographic printing system that produces text, business forms and other images on plain 8½- by 11-in. paper was introduced here last week by Xerox Corp. The Xerox 9700 printing system prints two pages a second — up to 18,000 line/min — depending upon type size and format, according to a spokesman.

Print quality is achieved with a resolution of 90,000 dot/sq in., he noted.

A laser scanner is used to project images of both the form and its contents for simultaneous printing, the spokesman explained. Because the images are created electronically, type and forms design choices are virtually unlimited, he claimed.

The image of a page can be rotated 90 degrees, allowing continuous printing either vertically or horizontally from page to page with no reduction in productivity, he added.

Dual paper feeders and output stackers, "low paper" and "full output bin" operator warnings and a magnetic disk buffer support continuous operation. The buffer stores up to 800 typical pages of information from a magnetic tape or host processor, Xerox said.

The control subsystem of the 9700 provides data handling, formatting, buffering

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Appeals Review Denied

Justice Free to Press U.S. vs. AT&T

By Nancy French
Of the CW Staff

WASHINGTON, D.C. — The Justice Department will move ahead with its antitrust case against AT&T following a refusal by the U.S. Court of Appeals to review a claim by AT&T that the department has no jurisdiction in the case.

The appeal — actually a writ of certiorari — asked the appeals court to review the proceedings from the U.S. District Court in which Judge Joseph C. Waddy ruled last November that the Justice Department did have jurisdiction.

AT&T claimed that as a regulated common carrier, it is subject to regulation only by the Federal Communications Commission and state governments and is not susceptible to antitrust charges.

The appeals court has ordered that a stay on court proceedings be lifted, clearing the way for the two parties to begin exchanging documents in preparation for the case. The document exchange was interrupted last February pending the ruling from the appeals court.

In its suit, the Justice Department is accusing AT&T and its two subsidiaries, Western Electric Co. and the Bell System Laboratories, of monopolizing, conspiring to monopolize and attempting to monopolize the U.S. telecommunications industry.

The suit calls for AT&T to divest itself of Western Electric and to give up either a number of its 23 regional telephone companies or the bulk of its long-distance telephone business.

AT&T is discussing appealing the case to the Supreme Court — but "at this hour" no decision has been made, a spokesman said. Last winter, AT&T went to the Supreme Court and the appeals court on this matter at the same time, but was rebuffed and instructed to follow an orderly legal procedure, he added.

The Justice Department suit, which was initiated almost three years ago, is still two to three years away from the courtroom, according to Philip Verveer, lead counsel in the case.

Verveer is making an effort to prevent the suit against AT&T from becoming as protracted as the one the Justice Department now has under way against IBM.

Bell Agrees to Buy Others' Equipment

NEW YORK — AT&T, in compliance with an order from the Federal Communications Commission (FCC), will establish a subsidiary to obtain telecommunications equipment from non-Bell manufacturers for use in the Bell System.

The FCC order gave AT&T 90 days to propose changes that would give Bell System companies greater autonomy in selecting their equipment suppliers.

The subsidiary could be operational 12 to 24 months after FCC approval, AT&T said. The unit has yet to be named or its location decided, however. AT&T estimated a staff of about 1,300 would be needed to run it.

The subsidiary will take over most of the responsibilities of Western Electric's supplies purchasing organization, a spokesman said.

AT&T said it is complying with the order even though it doesn't believe the measures are necessary. "It has always been the policy of the Bell System to procure the best available equipment at the lowest overall cost, regardless of the source," the company said in its FCC filing.

SBS Being Probed for Antitrust

(Continued from Page 1)

earlier CML Satellite Corp. and, before that, MCI Lockheed Satellite Corp., according to an SBS spokesman.

The CID served on IBM asked that it supply all documents that relate to the decision to form SBS, the agreements, contracts or understandings among the participants of SBS, a description of the organizational structure of SBS, plans for deployment of the SBS system, and studies in the possession of IBM which relate to the domestic satellite (domsat) services.

IBM was also asked to produce all documents relating to communications held between employees of IBM and employees of AT&T "regarding any aspect of domestic satellites."

Further, the CID asked IBM for "all studies relating to the possible effect of the availability of domsat services upon any products or services offered or proposed to be offered by IBM."

"We view this immensely broad and burdensome demand by the Department of Justice as completely unwarranted," an IBM spokesman said. "We are considering how we should respond to it."

In a prepared statement, SBS said it "does not expect the [CIDs] to obstruct progress toward establishment of the SBS system."

The satellite carrier, which recently won approval of its domestic satellite application from the Federal Communications Commission (FCC), also called attention to attempts by the Justice Department to have the FCC consider competitive aspects of the plan.

The commission determined that "any arguably anticompetitive effects of the SBS system are not likely to occur" because of market structure and the "FCC's continuing regulatory supervision," SBS noted.

The Justice Department spokesman said his department had repeatedly attempted to get competitive aspects considered by the FCC, but the commission determined the domsat service is in the public interest from a communications standpoint.

A spokesman for Aetna said the insurance company finds the demands made by the CIDs "burdensome," but it intends to comply.

The information requested by the Justice Department must be supplied on or before June 30.

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NOSTALGIA

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(SyncSort—a few years ago.)

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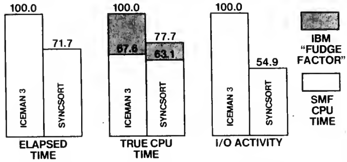
We've just finished testing IBM's new SM1-5740, Release 3, against SyncSort III-and-a-half in VS. And it turned out to be quite an experience! A little like looking in the mirror and seeing ourselves as we were a few years ago.

Not that the results of the tests themselves were surprising. *ICEMAN 3 didn't do much better in VS1 and SVS than it did in the earlier MVS tests.* The charts below bear that out:



In fact, ICEMAN 3 wouldn't have done as well as it did if IBM hadn't supplied its own "scorekeeper" in the form of SMF. As you probably know, SMF tends to be a little myopic, particularly where IBM sorts are concerned.

In VS, for example, SMF records only a portion of the True CPU Time that a sort consumes. The unrecorded remainder is lumped together in an amorphous package we refer to as the "IBM Fudge Factor." As a result, SMF has a lamentable tendency to score sorting errors as hits — and *vice versa*.

But what really floored us during the VS tests was a very strong sense of *deja vu* — of having been there before. We finally figured out what caused it: *ICEMAN 3 bears a striking resemblence to our old SyncSort II.*

Some of you who've been around awhile will remember that we brought out SyncSort II a few years ago as the answer to IBM's SM1-5734. And for a stretch there SyncSort II was king of the hill — the most advanced sort of its day.

The Computer Giant countered by introducing SM1-5740. It was accompanied by much hoopla and glowing references to "sophisticated I O techniques, PCI's, PEER for pre-sequenced data" and so forth.

The trouble was — for SM1-5740 anyway — that we brought out several new versions of SyncSort during that period.

And before long those "sophisticated I O techniques, PCI's, etc." began to fall from grace.

Now, wonder of wonders, IBM brings out ICEMAN 3, which skips back over all those generations to SyncSort II. In the meantime, here we are, coming out with new techniques that are going to make ICEMAN 3 even more outmoded than it is today.

If IBM keeps on in this vein, they're going to re-invent the roundest wheel of them all! But anyway we'd like to thank them for one thing:

Taking us back to the days of our youth!

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Sees Federation as 'Binding Force'

Afips President Plans to Strengthen Ongoing Projects

By Ann Dooley
Of the CW Staff

NEW YORK — Ted Williams, current president of the American Federation of Information Processing Societies (Afips), plans to "carry the flag" for his predecessors by strengthening ongoing projects and maintaining Afips resources where they are needed most.

In a recent interview here, Williams said he believes his most important goal as president is to effectively implement and follow through on specific projects begun by George Glaser and Anthony Ralston.

The Afips projects Williams sees as needing guidance and support include the newly expanded Washington, D.C., office, the Afips periodical study and the Long-Range Planning Committee.

The Washington office was established to keep pace with events in the Capitol and to relay that information to Afips' member societies — not to lobby Congress. Another staff person was recently added to help keep up with the information flow, Williams said.

The Afips periodical study is still in the midst of a feasibility study to see if the DP community could benefit from a nontrade publication, "something on the order of *Scientific American*," Williams said.

The third project, the Long-Range Planning Committee, is in the process of making recomendations on Afips' role now and where it should be going, he said. The committee is also studying solutions for finances and member communication and interaction.

Williams is a friendly, soft-spoken man who considers Afips the "binding force in a computer field of disparate missions."

He is a professor of engineering and director of the Purdue Laboratory for Applied Industrial Control at Purdue University.

In addition, Williams has written 10 books and over 200 technical papers in scientific and engineering journals.

A member of the DP community for nearly 30 years, Williams is ambivalent about the issue of professionalism. The industry can best prove its professionalism by the service it performs, he said.

He also admitted having mixed feelings about licensing. "I've been licensed for 20 years and haven't needed it," he stated.

Training Problem

Williams is aware of and concerned about the training problem within the computer industry. Universities can't be expected to become trade schools, but some compromise should occur, he indicated.

"Computer science students should be given some specialized training that will also be practical in a working situation," he said. "Cooperative programs are the best, but many students don't want to spend that long in school."

Williams attributed the boom in the DP field to "computerized automation." There has been a 15% to 20% yearly growth because of industry automation, he noted.

Ted Williams

However, he refuted the idea that computers are replacing low-level workers. "There has never been any substantiation of computers causing permanent unemployement," he said. There might be short-term dislocation, but DP creates more jobs in the long run, according to the former president of the American Automatic Control Council.

The father of two daughters who sometimes accuse him of being "old-fashioned," Williams believes women are entering DP and being promoted faster than ever before. "Women have our cooperation in the industry," but they must be trained, he said.

A woman Afips president, for example, must be qualified, and realistically, there are only a few around, he added.

Williams feels microcomputers will become commercialized soon for such uses as air conditioning and police alarms. "It's a matter of cost," he said.

One of Afips' most important functions is conducting the National Computer Conference (NCC), according to Williams. "We're working all the time to make [the] NCC a more viable force in the field."

And Afips draws its largest source of operating funds from the annual NCC surplus funds. The surplus is divided among Afips and its four principal constituent societies.

Last year Afips received over $250,000 or 50%, of those funds. The rest was divided almost evenly between the Institute of Electrical and Electronics Engineers, Inc., the Association for Computing Machinery, the Data Processing Management Association and the Society for Computer Simulation.

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Forrester to Be Honored at NCC

DALLAS — Jay W. Forrester, known even to laymen for his work in computer modeling and analysis of social systems, will be presented with this year's Harry Goode Memorial Award on Tuesday, June 14 at the National Computer Conference here.

Forrester, who is the Germeshausen Professor of Management at MIT, will be honored for his pioneering in the development of random-access, coincident-current magnetic core storage, which has been widely used as a memory device for digital computers.

He is also being cited for his contributions in the design and construction of Whirlwind I, one of the first high-speed digital computers, and for his achievements in the development of computer modeling and simulation techniques.

Also mentioned by the American Federation of Information Processing Societies (Afips), in announcing the awards, were his leadership in the development of the field of system dynamics, and his many additional contributions to the development of information processing, its applications to social systems and the dissemination of information on such developments through a series of papers and books.

Forrester is the 14th individual selected by Afips to receive this award — an honor that was established in 1964 to cite individuals who have made extraordinary contributions to the development of computer science and information processing.

Since 1956, Forrester has been applying his background in computer science and engineering to the development of computer modeling and analysis of social systems — an endeavor that led to a field now known as "system dynamics."

In recent years, Forrester has published papers describing his work in developing a comprehensive simulation model for studying the forces underlying inflation, unemployment, energy shortages, foreign exchange rates, mobility of people and tax policy.

Jay W. Forrester

Prior to 1956, Forrester was head of the Digital Computer Division of MIT's Lincoln Laboratory where he guided the planning and technical design of the Air Force Sage system for continental air defense, which is considered one of the most extensive early applications of digital computer technology.

Among the books published by this year's award winner are *Industrial Dynamics*, *Principles of Systems and Urban Dynamics*, *World Dynamics* and, most recently, *Collected Papers*.

Honors Received

Forrester has been the recipient of many other national and international awards and honors, including Inventor of the Year from George Washington University; the Valdemar Poulsen Gold Medal from the Danish Academy of Technical Sciences; and the Institute of Electrical and Electronics Engineers' Medal of Honor as well as its Systems, Man and Cybernetics Society Award for Outstanding Accomplishment.

A 1939 graduate of the University of Nebraska, with a B.S. degree in electrical engineering, Forrester received an M.S. degree in electrical engineering from MIT.

He holds honorary doctorate degrees in engineering from the University of Nebraska, Newark College of Engineering and the University of Notre Dame, in addition to honorary degrees in science from Boston University and Union College.

Tom Watson said "Think." So we did.

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So, to quote old Tom again, we hope we've given you cause to "think" - about your TP requirements.

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MMR

Shadow II

The World's most advanced TP Monitor

Study Recommends Users Pursue Only Critical Errors

(Continued from Page 1)

additional actions does it take to supplement hardware error checks with software checks of its own?

Further, are actions taken in a timely manner so errors do not propagate outside the system or cause secondary mistakes that are difficult (costly, time-consuming) to reverse? Patrick asked.

The third stage relies on checks built into applications programs to weed out any context-dependent errors, prevent propagation and preserve the integrity of the entire system, including both programs and data.

The final stage is the man-machine interface. Since some errors cannot be automatically recognized (much less automatically corrected), what information is made available to the human operators of the system?

Is it in a useful form, is it timely and are manual procedures in place to respond quickly so processing can continue? the author queried.

In the early '60s, at least one computer was designed that was thoroughly checked, Patrick said. Although he did not mention it in the study, Patrick confirmed he was referring to IBM's 1410.

Parity was established by redundant card reading stations and verified when data reached the CPU. Checking was performed on all transfer operations such as register to memory, memory to register and the like.

Parity was stored with data in memory and there was an unbroken chain of checking from the CPU registers out through the channels to the tapes and disks and back again.

Checking also went out to the printer, but stopped short of the print hammers, Patrick reported.

Most recently built computers have been "only partially checked. One senior designer informed me that a CPU could be fully checked by increasing the CPU circuit count only 10% to 15%," Patrick said.

"However, in the pursuit of lower prices, the manufacturers have convinced themselves that partial checking (i.e., memory, but not CPU) is adequate and hence the machine with an unbroken checking trail is a thing of the past," he charged.

Specific Recommendations

As a result of his literature search and field research, Patrick put forth 10 specific recommendations, which, if adopted, would affect the information systems purchased by the U.S. government.

Patrick suggested that the NBS:

- Require each full-line manufacturer to certify the degree of checking built into its hardware.
- Require each processor manufacturer to describe the arithmetic singularities in its product as an appendix to the programmer's manual.
- Require each vendor supplying mathematical software to certify the accuracy of the numerical approximations used against an established national standard. This certification should appear as an appendix to its programmer's manual.
- Encourage manufacturers to certify the degree of checking in their software systems.
- Collect a complete list of numerical hazards and publish a document showing numerical analysis difficulties a mathematical/scientific/engineering programmer should be cautious to avoid.
- Launch a study to evaluate development methods in practice today.
- Publish a series of best practices manuals designed to raise the average level of programming practices throughout the industry. Manuals should cover file design, error control, editing and the management of development.
- Publish another series of best practices manuals to raise the average level of operational practice throughout the industry. Manuals should cover machine operation, audit trails, production control, management of change and the systems and procedures efforts that control the processes adjacent to the computer,
- Select portions from the best systems found and synthesize a model system which demonstrates a consistent approach to error control.

The study, although commissioned by NBS, is not binding upon the bureau, which can accept or reject the study or any part of it.

If accepted, it will be published as part of the NBS Special Publications series.

Five Maryland Banks Pilot Ambitious EFT Switch

(Continued from Page 1)

bank cards, check-verification and guarantee services, balance inquiry and data capture at the point of sale.

The banks are starting with credit cards because there is a large pool of cards already in circulation, but they will be moving into debit cards as well, Abouchar stated.

The system is working extremely well in its first month of operation, according to Norman Foster, senior vice-president of First National Bank of Maryland and president of Maryland Switch.

First National has 10 terminals in operation, IBM 3606s and 3608s as well as one Touch-Tone phone, he said.

Volume has been low since the switch went operational April 4. Foster estimated the volume at about 1,500 transaction/mo, but noted it is in part a result of the low number of terminals installed (19) and the fact they are limited to one service.

In addition, that service is limited to the bank that owns the terminals, he said, adding he expects the volume to increase substantially as terminals become shared.

Fees for the services are determined by each bank which does its own marketing, Foster said. Maryland Switch only charges a fee for each switching transaction.

Each bank will continue to operate its own data base, he indicated. Maryland Switch will only route the transactions, compile statistics, do intermember billing and be the maintenance factor for the network.

Foster expects about 125 terminals will be in operation by July 31. These will run for three months and then "the gate's open," he said.

While the banks have not done any extensive research on consumer acceptance of the switching operation, Foster indicated all of the banks have automated teller machines (ATM) deployed and have garnered quite a bit of experience from consumer acceptance of these.

"And we feel this is just an extension of that as far as acceptance is concerned," he said, noting the ATMs may eventually be hooked into the switch either through the back end or the front end.

Xerox Printer Uses Plain Paper

(Continued from Page 1)

and operator control and communications. It includes an internal Digital Equipment Corp. PDP-11/34 minicomputer with 32K words of memory that can be configured with up to 64K words.

Other control system hardware includes a disk drive with a storage capacity of approximately 26 million bytes, a character dispatcher, the output device controller and the operator's console.

The control subsystem can accept information from an on-line IBM 360/30 and larger CPU or a 370/135 and larger CPU. Off-line, it accepts input from 1,600 bit/in., 9-track magnetic tape in Ansi formats.

All incoming information is preprocessed on the PDP-11/34, then buffered on the disk, Xerox said.

The imaging subsystem generates the pattern of modulated laser light that creates a latent image of the page on a photoreceptor belt. The xerographic subsystem includes the paper-handling mechanism and the facilities for development of the latent image and its transfer to the paper.

Paper is moved from the input stations in a path past the photoreceptor belt, where the image is transferred to it; through the fusing area, where the charged toner particles are fixed to it; and then to the output stackers.

A basic system will rent for $5,300/mo on a one-year lease with a charge of 3.5 mills per page. It can be purchased for $295,000.

Deliveries of the unit, which will be on display at the National Computer Conference, will begin in the third quarter of 1978.

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FCC, AT&T File Briefs Supporting Dataspeed 40/4 Tariff

By Molly Upton
Of the CW Staff

NEW YORK — The Federal Communications Commission's (FCC) decision to tariff AT&T's Dataspeed 40/4 as a communications device was proper, according to briefs filed by the FCC and AT&T with the U.S. Court of Appeals here in the case of IBM et al vs. FCC.

In response to the briefs by IBM and others asking that the decision be reversed [CW, May 9], the FCC maintained its order should be affirmed. AT&T, an intervenor in the suit, filed a similar brief, but asked only that the court deny those petitions asking for a reversal.

The suit was filed by IBM, the Computer & Communications Industry Association and the Computer and Business Equipment Manufacturers Association after the FCC declined to investigate or suspend the tariff.

The issue of whether AT&T should be allowed to market its 40/4 has been controversial since the device's inception. Even the FCC has come to different conclusions.

Initially, Walter Hinchman, chief of the FCC's Common Carrier Bureau, ruled the 40/4 was a DP device and thus could not be marketed by AT&T on an interstate basis under the terms of the First Computer Inquiry rules. These rules prohibit AT&T and other common carriers from offering DP equipment except through arm's length affiliates.

But a vote of the commission overturned that decision, opening the way for AT&T to market it. However, in its ruling [CW, Dec. 6], the FCC indicated its decision was contingent upon future findings in the Second Computer Inquiry being conducted under its auspices. Filings in the second Inquiry are due today.

Proper or Improper?

The petitioners had argued the FCC decision was improper because the Dataspeed 40/4 is a DP device.

Both AT&T and the FCC agreed the FCC's decision was proper because the 40/4 did not violate the Computer Inquiry rules and it was a communications device that could be lawfully tariffed under the Communications Act.

They also argued the FCC properly accepted AT&T's submitted material and correctly declined to investigate or suspend the tariffs.

Much of the argument focuses on whether the Dataspeed 40/4 is a DP device, according to the interpretation by the First Computer Inquiry.

The controversy is whether the Inquiry intended only to prohibit common carriers from providing a central computer for use in DP, as AT&T and the FCC contend, or whether it intended for its rules to cover forthcoming developments such as distribution of DP capabilities.

IBM and its copetitioners construed the Inquiry's rules as intending to prohibit carriers from providing both those devices included in the central CPU as well as those remote from the CPU.

Thus, they would have preferred the FCC to analyze the 40/4 in conjunction with a computer as an integrated system.

The FCC's brief argued that its decision to tariff the 40/4 had properly interpreted the Inquiry rules as "intended to restrict only offerings of DP capabilities of a carrier's central computer and not carrier offerings of terminals designed to communicate with computers.

"If the commission had intended to prohibit anything beyond 'use of a computer' [such as the offering of terminals designed to interact with computers], it would have delineated that, too, as unambiguously as language permits," the FCC brief continued.

"Apart from the Computer Inquiry rules, the functions performed by Dataspeed 40/4 constitute an integral part of communication as defined by the act and can be offered pursuant to tariff under the act," AT&T's brief added.

The FCC brief denied the petitioners' claims that it misconstrued the regulatory intent underlying its computer rules.

IBM and the others had argued that because the Inquiry defined remote-access DP service, the rules prohibited carriers from providing any customer terminals designed to access a computer, according to the FCC brief.

'Unsupportable Contortion'

"This conclusion is a totally unwarranted and unsupportable contortion of the plain meaning of the rules," the FCC charged.

"Review of the Computer Inquiry orders reveals no mention of any intent to prohibit carrier offerings of remote access devices in conjunction with transmission lines," the FCC continued.

In support of its argument, the FCC pointed out AT&T has offered teletypewriters for some years.

The commission was correct in refusing to extend "preemptively" its computer policy to bar the Dataspeed 40/4 offering, the FCC noted.

The FCC "must make its determinations on the basis of existing rules and public-interest findings, regardless of the fact it may be considering a modification to those rules in another proceeding," the FCC brief stated.

On another point, the FCC indicated the constraints imposed by its maximum separation policy are not applicable since it specifically found the 40/4 to be a communications device.

Success of DP in Corporation Equated With Its Invisibility

By Ann Dooley
Of the CW Staff

NEW YORK — Success in data processing is achieved when DP has become so integral to the corporate environment it is no longer even noticed, Charles Lecht, president of Advanced Computer Techniques (ACT) told a *Computerworld* Computer Caravan audience here recently.

Over the ages, every advanced technique has come in as a fad and then slowly become commonplace. As it is spread throughout the system, innovations rapidly become unimportant, he said.

By the 1980s, computer technology, as we know it, will have changed dramatically, he forecast, and DP managers will continue to bear the brunt of change.

DP managers live delicate lives, he said. "I tell managers just to assume hatred from all directions."

Managers should consider themselves "in a war," he advised. "Build yourself a bunker to stay in and get a good cadre of soldiers who will go down before you."

Lecht told his listeners that the only way to determine if an employee is productive is to give him more and increasingly harder jobs to see if he can do them. "Just watching is not enough," he warned.

Productivity is not distributed across time. Sometimes there will be results, but too often there won't be anything visible to hand over, he said.

As for the growing interest in minicomputers and distributed processing, Lecht said the rush to minicomputers might not be the answer for everyone. "Can five midgets do the same as one tall basketball player?" Lecht asked his audience. It's a difficult question to answer, he said, because the emphasis within the DP industry has shifted.

Centralized processing is a better system than a distributed one, Lecht continued. "If you can't control things in one room, why could you control it in 15?" he asked.

However, if it is successful in one room, it could be slowly expanded to others. "Otherwise, it's best to contain incompetence" rather than "disperse it," he said.

DPers have grown up with the notion only certain people should have all the facts and management is usually not one of them. "We'll decide what is to be done and then let them know what we want them to do" is the usual attitude, Lecht said.

Programmers, in addition to management, are often kept in the dark, he said. Programmer groups lack awareness; they don't know their overall purpose or where they stand in the corporate environment, he said.

For maximum productivity, programmers should be managed within a mission environment, he advised. When a project is completed, the group should be disbanded and reassigned.

For highest productivity, a manager must be "scrupulously honest" with his staff, Lecht advised.

DP managers and the company stand on a "floating platform" because there are no such things as hard and fast "specs," he warned.

Packages are a good way to go, but are likely to cost two and a half times the cost of the original price because of modifications and installation.

"Cobol is not a natural language," Lecht said, adding Cobol is on the way out.

Philatelic Honor Planned for NCC

DALLAS — The 1977 National Computer Conference slated here June 13-16 will be honored with a special postal cancellation to be used during the four-day conference.

The cancellation depicts a computer terminal showing the standard circular date stamp on its face and a punched card that reads "1977 National Computer Conference, Dallas, June 13-16."

The cancellation was designed by this year's NCC program chairman, Dr. Robert R. Korfhage, professor of computer science at Southern Methodist University (SMU), who is a member of the Dallas Philatelic Society.

The cancellation and cacheted envelopes cost 25 cents and can be obtained by contacting Korfhage at the Department of Computer Science, SMU, Dallas, Texas 75275.

Proposal Book Sales Soar!

Skyrocketing sales of a *how to* manual on proposal preparation indicate a probable best-seller for Mercury Communications, Inc. Written by two highly-experienced proposal consultants, *How to Create a Winning Proposal* is rapidly becoming the standard text for use in government, commercial and OEM proposal efforts. The book is suitable for hardware, software and service companies alike, and is a boon to anyone doing business with GSA, DOD, NASA, HEW or other government/military agencies.

Using a step-by-step instructional technique, the authors provide a virtual roadmap to the entire proposal process . . . including technical, cost and management section checklists to ensure the proposal team of covering all the important bases. Excellent guidelines are given on the contents, structure and methods of preparation for both solicited and unsolicited proposals. A tactical approach is used for developing an effective "win strategy" mobilizing the proposal team and controlling the input of the various team members.

Government requirements are covered in an overview of the U.S. procurement network, how it works, and how the proposing firm can increase its "win probability" in competing for prime and subcontracts. Detailed instructions on how to analyze and respond to RFP's, RFQ's and IFB's are included.

Copies of *Winning Proposal* are available pre-paid only from Mercury Communications, Inc. 730-CW Mission St., Santa Cruz, CA 95060. $55 includes 3-5 day delivery inside USA. In Calif. add $3.12 sales tax.

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In July of 1975, *with a spectacular absence of fanfare, Sun Oil Company opened one of the most sophisticated, secure, and reliable DP centers the world has never seen. At first two, now three, IBM 168's serve a network of more than 400 terminals from LA to Bermuda.*

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The Sun National Computer Center. So secret even a Dallas cabbie couldn't find it.

No signs...one good way to protect secret DP information is to build a "fortress". But another is to be inconspicuous. Remarkably, our Sun Center accomplished both. For instance, there are no exterior signs for identification. Even cab drivers often mistake it for "just another office building." Yet inside...

No access...without authorization. Five separate clearance levels isolate vital sections of the center. Sensitive areas are monitored by (you guessed it) a computer which "reads" special, light-through, optic-density badges. That same computer helps security staff be certain there are...

No intruders...at any given time, the security guard at his terminal, and the computer can determine exactly who is in the center and where. Closed circuit TV cameras (they're even equipped with windshield wipers) monitor entrances. But then, there are only two doors and...

No windows...at least none visible from the outside-in. But every interior view looks out upon a courtyard that's shielded from the "curious" by brick panels. It's an unusual architectural/security precaution taken despite the fact that there is...

No "traffic"...because nearly all processing is done from remote job entry, there's no security threat posed by people showing up on our doorstep with batch material. But even if some unauthorized person should gain entry to level 1 there are...

No labels...all stored data is assigned a secret number. That's all. No name. No symbol. Only the computer knows which number belongs to whom. So in effect, no one in the building — authorized or not — knows what's on a tape, or whose it is. To get your tape, a spy would have to steal and play back all 70,000, and then do some pretty fancy guessing.

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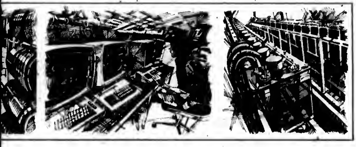
Fact: use most outside computer services and you're vulnerable to loss. Because natural disaster to your supplier can mean financial disaster to you. What to do? Trust a building that minimizes even the potential for loss through extraordinary engineering features.

Framed in concrete... experts will tell you the worst and most common damage a building (and its contents) can suffer is a collapsed roof. Our Dallas Center was specially designed to avoid that possibility. Entirely framed in reinforced concrete, the sides are not load-bearing, but rather...



"Blow-out" brick panels... these quick-release walls would be the first to go in the event of catastrophic structural pressure (like a tornado). Their presence means that even if the center should be hard-hit, our recovery time would be considerably faster.

60 ft. pylon foundation for earthquakes that don't happen... The point is: we went to great lengths (and depths) to cover contingencies — even tremors in a non-quake zone.

Reliability? Learn how we achieve a near-perfect uptime rate.

During April, for instance, the Sun Center maintained an uptime of 99.1%. And, we had an average record of 67 hours between failures. Pretty impressive. Compare these figures to your present source — inside or out. How do we do it? Here are two things to look for when you tour.

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Sun-designed UPS significantly reduces odds against a hard shut down.

Engineers being cautious as they are, we couldn't get ours to come right out and claim an uninterrupted power supply superior to any in the country. But just talk to one about our Dallas Center and listen for the pride and self-assurance in his voice. No wonder. At a cost of more than one and a quarter million dollars, we've installed as near-perfect a system as you're likely to find. All center power passes through storage batteries which help control power surges and eliminate "lag" if external power failure forces us to shift to our two huge diesel generators. Beyond the diesels are additional fail-safe systems you'll find equally intriguing should you qualify for a visit.

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When the decision was made for Sun Information Services to enter the commercial market, one of the world's top 15 companies of its kind was born. Still, we know we have to prove we deserve your business.

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Calendar

June 6-9, Los Angeles — **International Magnetics Conference.** Contact: Institute of Electrical & Electronics Engineers, 345 E. 47th St., New York, N.Y. 10017.

June 12-14, Washington, D.C. — **Future Directions in International Telecommunications,** sponsored by Arthur D. Little, Inc. Contact: Arthur D. Little, 25 Acorn Park, Cambridge, Mass.

June 14, New York — **Conference on Distributed Data Processing in Banking,** sponsored by Bank Administration Institute. Contact: BAI Meeting Services Division, P.O. Box 500, Park Ridge, Ill. 60068.

June 19-21, Andover, Mass. — **Telecommunications — An International Perspective.** Contact: Richard D. Murray, Director of Conferences, Institute for Graphic Communications, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

June 21-23, Andover, Mass. — **Update on Optical Communications.** Contact: Richard D. Murray, Director of Conferences, Institute for Graphic Communications, Inc., 375 Commonwealth Ave., Boston, Mass. 02115.

June 22-24, San Francisco — **1977 Joint Automatic Control Conference,** Contact: Society of Manufacturing Engineers, 20501 Ford Road, P.O. Box 930, Dearborn, Mich. 48128.

July 6, Tysons Corner, Va. — **National Capitol Area of Computer Measurement, Inc.'s conference, NCACMG-IV.** Contact: Robert P. Garrett, USA Milpercen, Alexandria, Va.

July 6-8, Chicago — **Consumer Collection Strategies & Techniques.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

July 11-13, Washington, D.C. — **Distributed Data Processing.** Contact: Department PR, AIIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

July 11-13, Madison, Wis. — **Surge Protection of Electronic Equipment.** Contact: Willis F. Long, Department of Engineering, University of Wisconsin-Extension, 432 N. Lake St., Madison, Wis. 53706.

July 20-22, San Francisco — **Manufacturing Data Systems,** presented by the American Institute of Industrial Engineers. Contact: AIE Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

July 24-47, Washington, D.C. — **Equipment, Supplies and Services Exposition,** sponsored by OCR Users Association. Contact: OCR Users Association, 10 Banta Place, Hackensack, N.J. 07601.

July 24-29, Geneva, N.Y. — **1977 Symposium for Innovation in Measurement Science.** Contact: Peter Vestal, Instrument Society of America, 400 Stanwix St., Pittsburgh, Pa. 15222.

July 25-27, Athens, Greece — **23rd International Meeting of the Institute of Management Sciences.** Contact: Joe Behar, IBM Corp., 1133 Westchester Ave., White Plains, N.Y. 10604.

July 28-29, San Jose, Calif. — **Association for Computing Machinery Pacific 77 Regional Conference.** Contact: Peter Szego, Ampex Corp., Mail Stop 3-22, 401 Broadway, Redwood City, Calif. 94063.

Call for Papers

1978 IEEE INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING, Tulsa, Okla., April 10-12, 1978

Authors should submit titles and abstracts in the areas of general signal processing, speech processing, underwater acoustics, seismic signal analysis, electroacoustics and noise measurement

One hundred word abstracts should be sent by Sept 22 to Thomas H Crystal, Institute for Defense Analyses, Thanet Road, Princeton, N.J. 08540

LAWRENCE SYMPOSIUM ON SYSTEMS AND DECISION SCIENCES, Berkeley, Calif., Oct 3-4

Papers invited in all areas of systems and decision sciences and their applications to planning, control, modeling, forecasting, identification and other aspects of decision making Of special interest this year are papers relating to energy systems, although applications are sought from all types of engineering and socioeconomic systems

Authors should send three copies of a detailed abstract by June 15 to D D Siljak, School of Engineering, University of Santa Clara, Santa Clara, Calif 95053

EUROCOMP 78, THE EUROPEAN COMPUTING CONGRESS 1978, London, May 9-12, 1978

Topics include, but are not limited to the impact of on-line information systems, applications and case histories, information systems design, multimini systems, distributed and dispersed systems, time-sharing systems, data bases in an on-line environment, systems economics and feasibility, cost benefit analyses, operations management of the information system, fail-safety and security measures, fallback procedures for systems failure, national and international data protection legislation, achieving privacy and data integrity, the cost of privacy and transfrontier data regulation

Also, computer network design, public data networks, PTT plans and developments, value-added services, private data networks, network control and monitoring, network interconnection, regulatory and tariff issues, host and terminal interfacing and terminal handling protocols

One thousand word summaries should be sent by July 29, 1977 to Eurocomp 78, Online, Cleveland Road, Uxbridge UB9 2OD England

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2. System Down—Disc Failure.
3. System Down—Repairing Hardware.
4. System Down—Restoring Data Base.
5. System Down—Software Failure.
6. System Down—Changing to a Larger Processor.

Lots of things change when you go "on-line." Mostly for the better. That's why this is the most important trend in data processing today. But the one area which concerns management the most is "What happens when the computer goes down?" It's a good question. and until Tandem introduced "NonStop" processing last year the answers weren't pleasant. Service is interrupted; that's bad enough. But there is worse news still. At the instant of failure, a transaction in process could be lost (or duplicated), a record being updated could be destroyed, or a pointer changed incorrectly could cause the loss of untold records. In short, loss of service is the surface cost. Loss of data base integrity is an even greater problem. Tandem's NonStop System, hardware and software, is the first top-down, designed-in solution to both these problems. To make it even better, we've designed it so it's easy to program, easy to expand, and easily the most efficient transaction processing system around.

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Every computer will fail sometime. The bigger they are, the more often they fail. Tandem has replaced bigness with a unique multiple processor architecture. Workloads are shared by the processors under control of Guardian, the only NonStop Multiple Processor Operating System available regardless of price class.
When a component fails, Guardian automatically reassigns both processor and I/O resources to ensure that in-process tasks including file updates are completed correctly. You decide the priorities; Guardian does the work. And no interruption of your "on-line" workload occurs. Restart is virtually instantaneous.

2. System Down—Disc Failure.
When one of your disc storage devices fails in the middle of a file update, unknown damage to the record, to record pointers, or to indices can occur. Enscribe, Tandem's NonStop Data Base Record Manager, ensures that the damaged record is restored; and, with our optional Mirror Volume duplicate file technique, that operation is continued using the back-up file. The back-up files are created automatically and are used by Enscribe to improve system response time. When the down disc is repaired so are its files, automatically, by Enscribe. You decide which volumes to back up; Enscribe maintains them, and no interruption of service occurs.

3. System Down—Repairing Hardware.
With any system, a hardware failure must be repaired. But only with Tandem can the system keep operating, right through the failure and through the repair, too. Tandem's Customer Service Representative can remove and replace any failed module in your system without interrupting service. The operators at terminals and the programs in process are totally unaware of either the failure or the repair. And routine maintenance, too, is performed with the system fully operational. This is one more unusual feature of our system, but without it, no system can truly be called "NonStop."

4. System Down—Restoring Data Base.
When a hardware failure occurs during file update in any "on-line" system which is not NonStop, there is every reason to question the integrity of the data base. Integrity of the data base is crucial. For this reason, elaborate procedures to maintain restart points and backup files are required in almost all "on-line" systems. Not with Tandem. Using Guardian and Enscribe, the Tandem NonStop System ensures that all transactions are completed correctly even if a processor, I/O channel, disc controller or disc drive fails during that transaction. Equally important, the system downtime normally required for "restore" and "restart" operations is eliminated.

5. System Down—Software Failure.
System software crashes are an important source of downtime in ordinary on-line systems, but not in Tandem installations. Because all Tandem software is designed and tested to run in a multiple processor environment, it is also designed and tested for failure modes never considered in single processor systems software. Most important, the use of independent processors, each with its own memory, assures that a software failure in one processor cannot cause a failure in a second processor or contaminate the data or programs executing in that processor.

6. System Down—Changing to a Larger Processor.
On-line systems tend to grow, and as they grow they change. New applications, more stations, improved service; all of these result in a need for bigger, faster processors. With Tandem's NonStop System you can actually add processors, add memory, and add peripherals without any re-programming whatsoever. Using Guardian, Enscribe, and Envoy, Tandem's Data Communications method, all user programs and all files are geographically independent. They have to be for NonStop operation. You can also write your programs using a powerful high-level compiler for a multiple processor environment as easily as for a single processor.

7. System Up—Confidence Down.
When an "on-line" system is up, people come to rely on it. And because today's computers are reliable, people have come to rely on them quite heavily. Which makes it even worse when the system does go down, or the information it supplies is wrong. Confidence is severely damaged. And anyone who has tried manual back-up systems knows that they are not the answer. An automatic back-up, non-stop system is the answer. And Tandem has it.

DP Picture Relatively Stable

Employment Outlook 'Guardedly Optimistic': Survey

NEW YORK — A "guardedly optimistic" picture of employment for the remainder of 1977 has emerged from a recent survey that showed 54% of the nation's businesses expected overall employment in their organizations to increase.

The survey, conducted by Deutsch, Shea and Evans (DS&E), a human resources consulting firm here, also found that 28% of the industrial, business and service organization respondents saw employment as "stable" in their organizations. Only 12% expected it to drop.

In the area of DP, however, only 32% of respondents surveyed indicated the number of employees would grow, but 39% — higher than the overall average of 28% — saw employment as remaining "stable."

Survey data suggested a continuing emphasis on the hiring of women and members of minority groups (54%) and the recruitment of engineers (41%).

Reasons for Changes

Where executives expected stable employment levels for the remainder of the year, the reasons given ranged from having already met their hiring goals for the year to expectations that their businesses would remain stable.

An expanding economy and an increased demand for products and services were the reasons most often given for forecasting employment increases. Of the 54% who indicated increases, most cited a "general increase in business activity" or mentioned expansion programs and increased sales.

The 12% who foresaw a decrease in total employment in their organizations attributed it principally to poor economic conditions in their sectors of the economy and a "necessity for increased productivity." One mentioned "slower sales growth due to shortage of capital investments." Another cited "a decrease in business."

Businesses Represented

The survey represented businesses with employees ranging from fewer than 1,000 right up to those with 5,000 or more, from all sectors of the U.S.

More than one-third of the firms surveyed planned to hire additional production workers and new college graduates will be hired by about 38%.

This employment level forecast survey is one of a semiannual series which DS&E has been conducting since 1974. The findings confirm an earlier survey conducted by DS&E in October 1976 which predicted an increase in hiring for this year.

Speech Synthesis Patent Awarded

WASHINGTON, D.C.— A patent was awarded here recently for a computer that synthesizes speech.

The patent for an "adaptive linear prediction speech synthesizer" was granted to Bell Telephone Laboratories staff researchers Joseph Kohut and Joseph P. Olive. The machine is said to speak as fast as or faster than a human being. It will enable computers to speak to people — over the phone, for example — instead of a telephone operator.

Although the equipment has been used in the speech research division, it has not yet been used in actual telephone network business.

Olive has worked for Bell for eight years, and Kohut, an electronics technician, for 25 years.

Line" Data Base Systems
System solves them.

Tandem offers a proven, field tested solution to the two principal questions everyone should ask about an "on-line" data base system: What level of service will it provide? What protection does it offer for my data base?

Someday all "on-line" systems will be NonStop. Tandem 16 Systems are NonStop today. And without price penalties. Not everyone needs an on-line, real-time, non-stop system, but for those who do there isn't another solution worth thinking about. Tandem Computers, Inc., 20605 Valley Green Drive, Cupertino, California 95014 or Tandem Computers GmBH, Bernerstrasse 50A, Frankfurt 56, West Germany.

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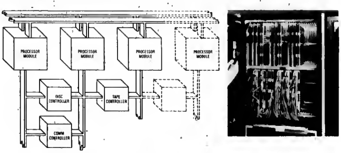
Photo and schematic show three processor modules with space for fourth module, interconnected to disc controllers, tape controllers and communications controllers.

TANDEM

The Tandem 16 NonStop System is composed of multiple, independent processors with dual redundant communications paths. The unique interaction between Tandem hardware and software assures not only continuous operation, and the integrity of your data base, but also throughput unmatched by any other computing system of comparable cost.

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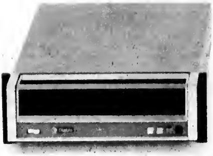

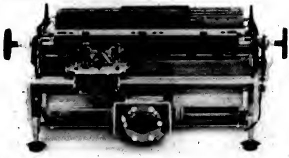

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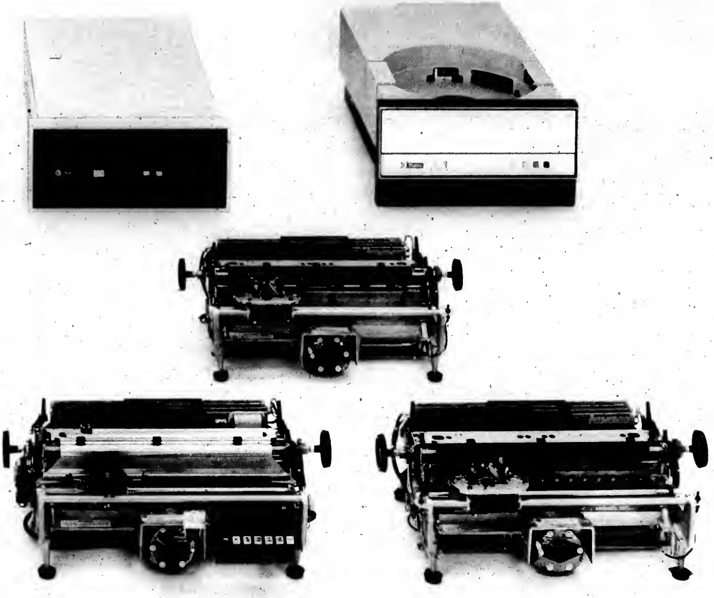

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Changes in Size, Cost Bring Minis Into 'Adolescence'

By Ann Dooley
Of the CW Staff

MINNEAPOLIS — The minicomputer industry is just "entering its early adolescence the stage the rest of the industry went through in the '60s," Steve Dukker, keynote speaker at the *Computerworld* Computer Caravan, said here recently.

"In the last five years, there's been such a revolution in technology, size, cost and memory," that the mini has broken out of the scientific, education and control industries and integrated itself into the commercial marketplace, Dukker, president of Dedicated Systems, Inc., said.

During the infancy of minicomputers, the OEM systems manufacturers looked at the industry and went right into it, he said. But it was a vertical marketplace; the minis were built for certain applications and so were confined to very specific functions. They were modified from the scientific application minicomputers and had no standardization whatsoever, he said.

"But as the minis began popping up in more and more places, software companies stepped in to increase their capabilities and allow them a combination of simple performance tasks," he said.

"The minicomputer manufacturers weren't in the forefront of the changes because they were too busy pumping iron, just pushing out the machines," Dukker said.

It was Basic Four Corp. that started the idea of selling a general mini to businesses and met with "phenomenal success," he said.

It was then that manufacturers began to take a second look at what they were making and decided to reconfigure the basic selling point.

Few Similarities

There are still not many similarities between systems and the trend toward standardization has just begun, he said. Actually, a cross-fertilization has occurred: The large user has learned something from the small user which is that minis can be used for certain applications in their operations for less cost than doing it all out of one large CPU, Dukker said.

The use of minicomputers in this manner has led to decentralization and a different construction of the DP utility, he noted. But the shared cost benefit has made all the changes and tumult worthwhile, he commented.

"The power that used to be associated with a strong centralized center is now becoming available to anyone," he added.

"As I see it, the next stumbling block is the human factor," Dukker stated. Mini manufacturers must change their image of "dropping the system off at the door of the user." They must work with the user and the system until each is confident and happy with the results, he added.

The industry is at the "standpoint of growing young once again," Dukker noted. "We must step back to decide how we want to develop to maturity. It's exciting to think that we really don't know where we'll be in the next five years," he said.

IEEE Publishes Book Discussing Microprocessors

NEW YORK — *Microprocessors: Fundomentals and Applications*, a book of selected reprints, has heen published by the IEEE Press. The collection was edited by Wen C. Lin of Case Western Reserve University.

The purpose of this book is to aid those who are weak in computer fundamentals to gain an understanding of how microprocessors work and how they are being applied in system design and instrumentation.

The 43 reprinted papers are arranged by subject category into four parts. The first part contains introductory papers giving general information on microprocessors. In the second part, the reprints cover architecture, software, interface, system development aids and testing. The papers in the third part describe some of the myriad applications of microprocessors, while those in the fourth part are concerned with assorted topics, including the use of microprogramming techniques as a bridge between hardware and software engineering.

The 344-page volume, sponsored by the IEEE Computer Society, is priced at $9.95 for the paperbound member edition. A clothbound edition is available for $19.95 (discounted to $14.95 for IEEE members).

This book can be ordered postpaid from the IEEE Service Center, 445 Hoes Lane, Piscataway, N.J. 08854. Payment should accompany the order.

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CDP Takers Up

CHICAGO — The number of DPers who have signed up to take the Institute for Certification of Computer Professionals (ICCP) exam for DP certification reached an all-time high this year, according to ICCP President G. Gary Casper.

ICCP statistics indicate that 3,164 persons registered for the February 1977 exam, 27% ahead of last year. Further, 1,505 passed the exam, or 47%, compared with last year's 37%.

Scrounging Produces Ultralow-Budget Shop

By Robert L. Glass
Special to Computerworld

BELLINGHAM, Wash. — If scrounging is the most cost-effective way to build a computing installation, then Dr. Melvin Davidson of Western Washington State College (WWSC) probably deserves a Computer Manager of the Year award.

WWSC's installation is a hodgepodge of finely tuned miscellaneous equipment ranging from Interdata minis which behave like maxis to a 360 maxi which by contrast performs like a mini. And for roughly $100 a month per port, WWSC supports a "terminals-for-all-students" philosophy that nearby Simon Frazer University rejected for some applications because its traditional approach cost nearly 15 times that much.

Davidson's secret of success is watching WWSC's (and the taxpayers') dollars. His three Interdata 70s came used for $7,000. The innards of those machines, and of his more conventionally purchased Interdata 7/32s, are liberally sprinkled with replacement components from other manufacturers. His staff does its own maintenance.

Davidson watches the ads in the journals for bargains and is willing to risk innovative approaches. The installation, which consists of a 360/40, a now ancient IBM 7090, three Interdata 7/32s and the three Interdata 70s, is configured in these unusual ways:

- The 360 "front ends" for the 7090 and "back ends" for the Interdata units.
- The 7090 is maintained (for $700 last year) by cannibalizing parts from a backup 7094.
- The Interdata 7/32s have three times the memory of the 360 and run five times as fast. They support general campus time-sharing.
- The time-sharing installation functions 24 hours a day without operator support. (Tapes are not used and disks are on-line.)
- Tape cassettes compatible with terminals are loaned to students for maintaining their own data bases. (This has not been entirely successful, since cassette tape formats are not standardized, Davidson said.

The result of this low-budget approach is that terminal time is sold at 30 cents per connect hour, less than any other method available to WWSC. The system supports heavy computer-aided instruction (CAI) usage as well as more traditional applications, and during the night hours it becomes the college's business DP center. Twenty four hard-wired terminals are hung on each of the three minis.

Davidson, who has successfully brought WWSC through the minicomputer revolution, is now scratching his head over the impact of the micro on the low-budget manager. From his hardware-oriented vantage point, he sees the computer center of the future as a staff of systems maintainers who make the rounds of decentralized computer centers, keeping them running in optimum fashion. For example, WWSC is gradually isolating each hardware system to the discipline or disciplines which need it. . .

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With a Smarts controller, operators can keyboard information, edit data, pre-store formats for operator prompting and can print out data in hard copy form. In addition, your computer can poll your Smarts-controlled system at any desired frequency.

Concurrent operations.

As the chart shows, our Smarts controller can perform several operations concurrently.

For example, it can print data to a local printer, while data is either being transmitted to, or from, your computer—all while your operator is inputting data.

This concurrent capability enables your operators to work without interruption, making maximum use of their time and the Smarts-controlled system.

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The Smarts controller also features a powerful 26-command text editor, providing word processing functions. Entire data strings can be substituted with unlimited character insert/delete capability.

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CW Photo by A. Dooley

Anna Tipton

Technical Skills Often Secondary

Worker Rapport Seen Vital to Success

By Ann Dooley
Of the CW Staff

NEW YORK — The ability to get along with others in a working environment is the most important requirement for employment. The second is the ability to communicate, according to Anna Tipton, vice-president of Advanced Computer Techniques (ACT), a consulting firm.

These qualities are often more important to the success of a project than the amount of technical expertise the group has, Tipton told a Computer Caravan audience recently.

Hiring practices are of prime importance for the success of the working situation and the projects, she added, and the most important part of the hiring process is defining the personnel requirements for the particular job. These should be worked out before starting recruitment, she said. "You must determine whether you want a superstar or a good steady programmer who will stay for several years," she noted.

After defining the job position, certain technical and personal aspects of the applicant should be considered before hiring, Tipton said.

Personal characteristics that are important to examine are maturity level, appearance, communication abilities, reaction to stress, initiative and ambition, she said. The importance of each of these varies according to the specific need and kind of job.

A review of technical experience should include asking what kind of background the applicant has within a particular application, she said. In addition, a DP manager should find out what kind of related equipment and operations experience the candidate has had. Further, his prior training, exposure and general business experience should be considered, she advised.

Tipton also warned employers not to rely too much on resumes as these can often be misleading as to the actual amount of experience an applicant has had.

Tipton often questions an applicant to discover if he holds a general understanding of the implications and results his work has had on the companies he has worked for in the past. "It's hard to operate in a vacuum and if the employee knows all the implications of his project," he is probably fairly sharp, she said.

Salaries can often be a delicate problem in hiring, she said, because new employees with specialized knowledge could be asking for far more money than the present staff members are earning who have been on the job for years, she said.

"There are not that many people on the market who are good, so those who are good command high salaries," she said. The reason for the numbers of low-level people is the market slump in the 60s, she said. This abundance of less experienced workers has also led to a greater emphasis on outside courses and on-the-job training, she added.

During Tipton's workshop, one attendee asked why someone leaves a job. Answers ranged from the fact that the "grass is always greener . . . " to the fact that employers often "oversell" a job to an applicant; a situation that results in a dissatisifed employee. The employer should specify exactly what the job is and specify where it could lead.

Another aspect of job dissatisfaction is lack of recognition, attendees agreed. The salary review is too often tied to performance review; instead, there should be more consistent meetings with the staff to pat them on the back or kick them in the pants, without making it a traumatic event, one attendee noted.

Qualities that make a good manager are communication and constant interaction on the right level with the staff, the group agreed.

One member of the audience said in his company, manuals are kept from the programmers. Most disagreed with this philosophy because it inhibits employees from adding to their knowledge. As long as they are learning they're happy, but when they stop, they become bored and dissatisfied.

In the end, hiring has to be purely subjective, she said. "I've never seen a test that could pick out who would be good." The applicant should be judged on his own merits, she added.

In addition, a company shouldn't limit hiring to math or computer science majors or even to people wth college degrees, she said.

Tipton also pointed out that in the early 70s people were looking for security because of the 60s slump, but now there is more of a demand for interesting work. Salaries aren't the major issue because good people can get pretty much what they want, she said.

Equifax Must Let Public See Its Consumer Data Files

BOSTON — Under an agreement with Massachusetts Attorney General Francis X. Bellotti, Equifax, Inc. must allow individuals here to see whatever information is in its files relating to the consumer, except medical information, in addition to the information found in its standard consumer report.

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Stop for a minute and think about what that means to your current and future plans for using 3270-type data entry devices. It means seven benefits that would otherwise be unobtainable anywhere.

First, it means you can build a 3270 network virtually overnight, regardless of your current processor model or software system, and without any front-end hardware or software. A PIX-II local controller installs on you CPU's byte multiplexer channel, taking the place of a 3272 local controller. A PIX-II remote controller installs at each remote site, with a 3272 local controller. The 3271 remote controller is eliminated. The installation takes a day, requires no software modification, and gives you—immediately—a completely operational 3270 network.

Second, that installation now puts all of your 3277-type terminals in local mode, as if they were right at your host CPU site, attached to a byte MUX channel.

Third, now that your CRT stations are in local mode, polling is totally eliminated. Every 3277 is served on a demand basis, as if it were the only terminal on the network. Nor is there any need for polling software overhead. You don't need it.

Fourth, the result of this systems configuration is improved response time for every 3277, regardless of its location. On average, that improvement will be about four times better than what you now achieve: from an average of eight seconds, to just under two seconds. For *every* 3277, consistently.

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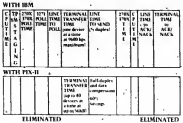
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The above illustration depicts the typical sequence involved in executing a single 3270 transaction under IBM protocol—and the many little ways in which PIX-II eliminates or reduces many of those sequences. Can you afford not to find out more about PIX-II?

Fifth, no remote terminal access software is needed. None. No remote BTAM or remote TCAM if you operate under non-virtual methods. No VTAM and related NCP front-end software (there is no front-end) if you operate under virtual technology. That feature alone saves you months of effort.

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Seventh, putting up an instant 3270 network is just the beginnings of what you can do with PIX-II. Once it's installed, you can attach remote peripherals, HASP or JES work stations, console controllers, and even use it to develop a true CPU-to-CPU link without ACF.

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The 10th annual *Guide ta Audia/Visual Instruction an Data Pracessing*, released last week by the University of Colorado, demonstrates that in just five years we've gone from "famine to feast." Five years ago there were significant gaps in the array of multimedia materials for self-study. Today the training director not only has instructional materials available for all basic areas, but has a choice of courses from several vendors.

For example, the data base instructor has a tremendous advantage this year over last. Dr. Fred McFadden, who teaches our data base course, has a three-prong approach: basic instruction through textbook and lecture, reinforcement through self-study with Deltak's IMS course and hands-on experience, with a five data base management system (DBMS).

Advanced Systems, Inc. (ASI), Deltak and Edutronics — the big three vendors in audiovisual (A/V) courses — continue to widen the gap between themselves and their competitors. The computer vendors are not producing A/V courses at anywhere near the volume of any of these companies, although Honeywell has released several new courses.

Dave Cook, manager of Honeywell Education Services, said the company's "predominantly Series 200/2000 oriented curriculum of multimedia offerings evolved into a far more generic array of programs, such as: Fundamentals of EDP, Concepts of Disk Processing, ANS Cobol Concepts, ANS Cobol Programming and RPG II Programming."

Serge Beauregard, vice-president of product development for Deltak, reported many new courses. Among those are: Data Base Overview (two modules), CICS/VS Facilities (four modules), IMS Design Techniques (six modules), CICS Concepts and Facilities (five modules) and Using MVS Catalogs (two modules).

J. Daniel Couger On
Education

Al Allen, vice-president of marketing, provided a list of new ASI courses produced during the first half of 1977. Among those courses are; Total (three modules), Mark IV (two modules), ANS Cobol (six modules), CICS/DLI (two modules), Networking a DP Communication System (one module), Structured Design (two modules), Computer Security (three modules, updated), DOS/VS Operator Training (five modules).

Pat Sorrentino, vice-president for research and development, described Edutronics new courses: CICS/VS (seven modules), BAL Efficiencies (five modules), Assembler Language, Entry Level (four modules), Sort Merge (one module) and Report Writer (one module).

"Making It Count"is a college-level introductory course about computers and computer applications. The course consists of twenty 30-minute video sessions, instructor and student materials. It was developed by Boeing Computer Services.

We are using Digital Equipment Corp.'s new 17-part multimedia course on minicomputers with good results. Entitled "Introduction to Minicomputers," the course is an audio/filmstrip series designed to present computer fundamentals for students, technical personnel without computer knowledge and general corporate management.

Each year the National Compute Conference includes a Computer Science Film Theater. Adrian Basili of AT&T was the coordinalor for that area of the 1976 NCC; his list of films and sources is included in the A/V guide.

Lansford Publishing Co. produces a wide variety of transparencies for use in DP courses: the systems approach (15 transparencies), Introduction to cybernetic systems (15 transparencies), simulation (12 transparencies), introduction to DP (36 transparencies), computer hardware (81 transparencies), Fortran (20 transparencies), information systems (20 transparencies), data processing system design (16 transparencies).

The 10th *Annual Guide to A/V Instructian in Data Pracessing* lists the products of each of the suppliers of A/V materials. For a copy, send $4 ($5 if you require an invoice) to *Camputing Newsletter*, Box 7345, Colorado Springs, Colo. 80933.

Couger is prafessar of computer and mangagement science at the University of Colorado.

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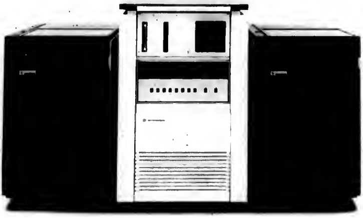

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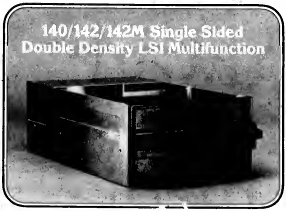

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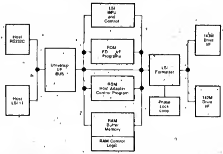

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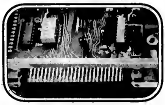

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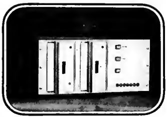

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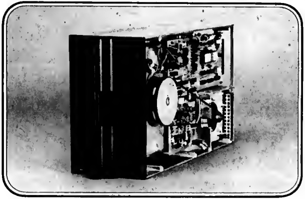

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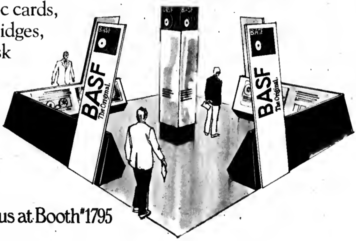
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Decentralization Seen Entailing Make-or-Break Choices

By Esther Surden
Of the CW Staff

PHILADELPHIA — Organizations switching from a centralized DP department to decentralization with minis are faced with many management decisions that can make or break the effort, according to Bud Bocher, manager of information services for the marketing department of Consolidated Rail Corp.

Speaking at a recent workshop on the organizational impact of distributed processing, Bocher led attendees through a hypothetical case study of a firm that made the switch, citing all the areas of contention in such a move.

The company used in the study was called Crackling Electronics, Inc., a $500 million multilocation manufacturer of specialized electronics equipment.

The hypothetical company was organized into four divisions, with three divisions responsible for manufacturing and one for assembly.

Each of the divisions was designated a profit center and, with this reorganization, a new vice-president of DP was hired because the former VP couldn't hold down DP costs.

The workshop attendees were told to assume they were vice-presidents of DP and decide if they would continue centralization, but add a charge-back system; separate the DP organizations into the different divisions; combine the two or take some other approach.

After the attendees thought about their answer, Bocher supplied his own solution — a mix of centralized and local processing.

This would minimize hardware expenditures by making use of the existing centralized hardware, centralize processing for the elements common between the divisions and not rely as heavily on communications lines as a terminal-based system would, he explained.

The large batch system could be used for bulk work, but the divisions would have a local installation responsive to the management needs.

The central site, however, would have to produce a "throw away" data set for corporatewide information to be given to each of the divisions, he said.

Assuming that staffing the hypothetical DP departments at the divisions was not difficult, the vice-president of DP would then call a meeting to determine how equipment standards should be established, who should place the orders with manufacturers, if it is necessary to formalize or format any reports and how to establish edit and validity criteria.

Another problem is how the division DP manager should relate to the corporate vice-president of DP, he said.

According to Bocher, any solution should be based on the needs of the individual DP department and "each division evolves its own standards based on what the division general manager requires for support."

However, certain considerations have to be accounted for, he noted, including operating software for compatibility, transfer of programs and the discounts that can be derived from buying the same hardware in multiple units.

Since different general managers will want to see reports and information formatted as they desire, standard formatting of reports is not necessary, he added.

The throwaway data set will provide the kind of information needed by the corporation. Edit and validity standards should be provided by the corporate level, however, he emphasized.

The best approach for the organizational chart to follow is to allow the DP manager in a certain division to report to the general manager of that division, Bocher said.

However, the manager should also have to look to the vice-president of DP for technical and strategy guidelines, he said. This is the most efficient way to keep everyone happy, he indicated, even though it is tricky.

On the division level, the attendees were asked to consider how the DP organization should be arranged. Most of the attendees agreed the division DP department should be organized the way the central department used to be — or the way the DP manager could best get the job done.

CDC's Technotec Receives IAA Citation

MINNEAPOLIS — Technotec, a worldwide technology exchange service of Control Data Corp., has been named "Information Product of the Year" by the Information Industry Association (IIA) in Washington, D.C.

Selected from a field of 31 candidates during IIA's first annual National Information Conference & Exposition, Technotec was cited for "bringing data on the world's technological processes and needs to even the smallest inventor in his garage."

Started in 1975, Technotec is a computer-based service using Control Data's worldwide Cybernet services network.

To use it, an inventor, organization or potential user lists a process, service, product, expertise or need on the data base at a minimum cost of $100 per year for a 1,000-character description.

Someone looking for a particular type of product or service can then search these listings using a telex, TWX, telephone or terminal connection for an average charge of $8 to $10.

After would-be-buyers and sellers locate each other via Technotec, they are free to deal directly. The company does not charge brokerage fees or royalties.

NCIC Classifies Its Active Records

WASHINGTON, D.C. — As of May 1, the National Crime Information Center (NCIC) contained 6,491,850 active records, according to the May issue of the NCIC newsletter.

A breakdown showed. 128,019 wanted persons, 851,539 stolen vehicles, 286,637 license plates, 1,131,577 various articles, 1,134,654 guns, 1,933,504 securities, 12,894 boats, 999,727 criminal histories and 13,299 missing persons.

In April, the NCIC network transactions totaled 7,579,080, an average of 252,636 per day. The hour from 9 p.m. to 10 p.m. Eastern Standard Time was the peak hour on NCIC during the month, with an average of 11,810 transactions.

Unscheduled downtime totaled 27.6 hours, or 3.9%.

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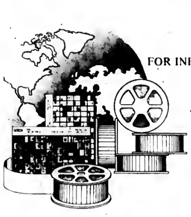

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P and L responsibility for consumer calculator profit center Responsibilities include product line definitions product development cost reduction and design to cost product pricing and market analysis BS in Engineering with at least 6 years related experience including 2 years in management capacity

Advanced Applications Programmer
Duties include writing testing and documentation of accounting and financial programs for small business computers Must have good programming skills along with some knowledge of business data processing Requires degree in BA CS or DP plus knowledge and experience in BASIC Assembly language and 2 years experience

Market Development Analyst
Perform analysis and market research to determine optimal marketing strategies for new computer products including distribution channels served markets service and software requirements advertising and product positioning etc Aggressive personal goals in marketing and product management based on performance are essential Requires a BS in Engineering or Marketing plus MBA Minimum skill requirements include knowledge of computers programming and small business DP market

System Computer Programmer
Specifications design coding integration and debugging of operating systems Self-checking diagnostics device service routines file management etc is also required Work with high level language translators Requires BS in CS EE or other relevant technical discipline and 2-5 years experience in Assembly language programming Experience in design and specification writing desirable

Scientific Programmer
Develop algorithms microcode assemblers and simulators supporting LSI microprocessor designs for consumer products Requires BS MS in EE, CS Math or Physical Science

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The Waves of Change

By Charles P. Lecht

Decentralization in the guise of distributed processing is nothing new – but this time around there are some important differences Lecht believes 'suggest that effective distribution of DP power can be achieved.' This week, in the latest excerpt from his soon-to-be-published book, Lecht explores the problems, the potential and the direction of distributed processing from both users' and vendors' viewpoints.

CHAPTER VI

Like birds flocking from one feeding area to another, today's computer technologists seem to be revisiting an old territory with new hopes for nourishment success. Thus, in the latter 1970s we are once again revisiting the field of decentralized DP.

For as long as I can remember, no one would argue that a distribution of DP resources in such a way as to carefully weave these into the operational fabric of quasi-independent corporate entities wasn't the way to go. But few, if any, companies could hope to support their DP needs this way with past technological offerings.

Today's ever-changing hardware, software and communications environments suggest that effective distribution of DP power can be achieved. This could allow for the fulfillment of the most difficult article in Chapter II's "DP Charter," namely, that "[DP's] success is measured in terms of the proliferation of its capabilities throughout the corporation and the ultimate loss of its own identity as an independent corporate suborganization."

Today, therefore, many corporate entities depending upon centralized corporate DP centers are now lobbying for their own resources in the form of micro- or minicomputers or intelligent terminals. While they are succeeding in many instances, inherent conflicts (among other reasons) with long-term corporate data processing plans are limiting the speed with which they are achieving their goals. We will refer to these entities as end users to distinguish them from the classic centralized DP organizations established to service them.

Such end users frequently think they can solve their problems on their own, which at times they can. However, many learn that doing so entails considerable duplication of effort with other end users or the remaining DP department.

Also rearing its ugly head once again is the de facto long-thought-dead reason for centralization in the first place, that is, the incredibly difficult-to-fulfill requirement that operating entities become involved in matters of technology, including programming, operations, standards and communications. Incompatibility problems, if none others, frequently torpedo any hopes of success.

Many DP organizations, while fully aware of the long-range problems posed by distribution of DP resources, nevertheless accede to today's trend either because of their inability to meet the user departments' growing applications demands or out of simple frustration at turning current embattled situations around.

Whatever the cause, conflicts between end-user departments and centralized DP organizations are arising everywhere, with substantial casualties occurring among the innocent noninvolved.

Today, by the time DP organizations have taken steps to respond to the growing applications development needs of their end users, individual user departments may have already committed themselves irreversibly to independent, stand-alone or distributed processing solutions. The computer industry's shift toward data base and data communications applications further complicates the process of resolving corporate conflicts of this type.

From their own point of view, larger users enjoy certain advantages in this situation which are not shared by small- to medium-scale users. Their greater resources, plus their access to alternate suppliers, tend to minimize the risks to them of an extremely decentralized approach.

In contrast, the small- to medium-size users, lacing in both broad-based experience and resources, can easily commit themselves to short-term solutions which will prove in time to have been more apparent than real.

New Class of Competitor

Until recently, the computer sales representative tended to call on and service centralized DP departments. The latter, immersed in the problems of "keeping things going," discouraged or prevented salespeople from interfacing directly with their end users.

As a consequence of this policy, end users naturally turned to more responsive minicomputer or independent intelligent terminal salespersons who had no prior involvement with DP center management. As this trend continued, major and centralized mainframe vendors found a new class of competitor emerging that established key links with those people in large corporations who are most involved in expediting and installing *new applications* — end users. It is these users which control today's key growth areas for the future.

IBM and some of the other major manufacturers are busily engaged in overcoming this problem as they have been known to overcome similar difficulties in the past. IBM's current product offerings in the distributive network systems area include the 3790 (its principal distributed intelligent terminal system), System/32s or the new System/34s, System/3s and, more recently, the Series/1, along with the Synchronous Data Link Control (SDLC).

These products and concepts are clearly oriented toward *hierarchical* networks with strong counterdependencies between terminals, controllers, multiplexers, concentrators, front-end communications processors and the central *contralling* host IBM mainframes, of which the 3033 is the latest.

IBM appears against any approach which implies "distribution of control," where the network components can be easily replaced by competitor equipment.

IBM Strategy

Obviously, IBM, Univac, Burroughs, Honeywell, NCR et al will stress their brand of distributive processing, offering greater reliability, more growth potential, a higher level of data security and easier implementation. It is possible that this "sales pitch" has some validity.

In IBM's case, however, on the basis of a review of the Telex trial exhibits and of trends emerging from recent IBM announcements and presentations to user groups, one can see the unfolding of that particular giant's "real" communications and distributed processing strategy. In our judgment, it is composed of the following elements:

(1) IBM will protect or lock in all future terminal business wherever possible. The methods employed to achieve this include the creation of host processor dependencies or a "total system" approach where the *full* functionality of the system is not available without IBM-supplied host mainframes, communications processors and their proprietary firmware and software.

The SDLC protocol, which is unique, also supports this strategy since its full details are not available to other vendors. IBM's emphasis on data security and total network system integrity is also directed at frustrating foreign terminal attachments.

(2) IBM will use common building blocks and combine technologies to achieve maximum function-per-dollar, thus greater economy of scale. Some of the methods of implementing this strategy involve the use of "standard universal controllers" (microprocessors) which are adaptable via microcode and software to many different applications.

Another method is the creation of combinations of controllers with specialized I/O components to produce industry-oriented terminals, such as insurance, banking, medical, education, supermarket, retail and factory data collection distributed processing terminal systems.

(3) IBM will attempt to provide easier migration paths so current terminal users may grow to eventually become total systems customers.

Additionally, wherever possible, the corporation will stimulate add-on business for those customers who currently have IBM host CPUs installed. To implement this strategy, IBM intelligent terminals must be restricted — they will have limited processing capability so as not to impact host systems sales.

Moreover, the application development languages available at the terminal will continue to have heavy, if possible, but at least some central host dependencies.

(4) While in the past IBM has not been prone to playing a leadership role in terminal products, its current continuous stream of these shows it is becoming more and more innovative, creating advanced terminal functions wherever possible.

For example, plasma displays have been introduced for the financial terminal system (Model 3600), and we expect to see this aesthetically pleasing flat panel display put to even greater use in future products.

Inkjet printers (Model 40/46) for the Office Products Division's word-processing market represent another innovation. Touch-sensitive screens for very reliable and easy-to-use factory data collection systems are another case in point.

The more sophisticated, complex, distributed terminal products (such as the IBM 3790, whose price was recently reduced) provide highly integrated features, such as disks, as well as special buffers that can only be customized or configured at the factory (not in the field).

The greater use of LSI circuits and microprogramming techniques, the emphasis on reliability, availability, serviceability and replacement modules for easier, low-cost maintenance and the current "leadership" provided by IBM in the data privacy and security area are other examples of its gradually unfolding product strategy.

(5) Wherever possible, the corporation will obviously attempt to minimize impact on revenues derived from existing, older terminal products, such as the 2740/41, 3270 display, 2780, etc. Its current campaign seems to emphasize purchase of these older products to avoid losses caused by self-impact issues.

Furthermore, one can detect what might be called a "cascade downward" strategy, whereby older products such as the 3270 display are combined with newer products such as the 3790, with such new arrangements intended to help sell the older devices (or, in other words, to unload "old iron").

Confirming this theory is the fact that a new IBM 3270-compatible display terminal was finally introduced on May 18, 1977.

(6) While IBM has and will continue to emphasize distributive processing with some host (or multihost) 370 dependency, this does not mean *continuous* host dependency; i.e., the central CPUs should not be allowed to cause the entire network of terminals or distributive processing systems to fail.

The distribution of processing functions such as data entry, editing, formatting and file updating should allow local operations to continue in a restricted fashion should the host processor(s) become inoperative. A balance will be achieved between total dependency and complete independence from the host CPUs to lock in the customer base without unduly disrupting critical customer operations. (The November 1976 announcement expanding advanced communications functions to support any IBM terminal network connection to any IBM host 370 [or multiple hosts] is a further indication of this concern.)

Distributive Processing Trends

Distributive processing can represent a compromise between centralized and decentralized processing. At the beginning of this chapter, I provided a snapshot of some of the chief issues which have lent impetus to the current distributive processing trend.

Others, not necessarily independent, include:

- The issue of human effectiveness vs. system efficiency (i.e., hardware performance-per-dollar vs. people productivity).
- Political issues, such as the fact that centralized information systems, now a vital part of the headquarters management function in today's decentralized organizational structures, are frustrating control by

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- Economics of scale: Hardware, software, data, space and talent sharing.
- Easier management and control of operations, standards, application development and data bases.
- Greater growth and expansion of CPU, storage and I/O devices.
- Improved total compatibility.
- Capability to process large, complex applications.
- Reduces duplication of effort.
- Higher total systems communications costs.
- Lower availability/reliability.
- Congestion factors — overhead responsiveness, contention over control.
- Larger incremental expansion steps and costs.
- Less flexibility or tailoring to end users' needs.
- Greater dependence on DP.
- Restricted and slower access to centralized files.
- Higher cost backup or redundancy.

DISTRIBUTED

- Lower total system communications costs.
- Higher availability/reliability.
- Greater responsiveness, lower overhead and contention.
- Smaller incremental costs for expansion and offloading from host.
- Easier tailoring to actual end-user requirements.
- Less divisional dependence on DP.
- Easier and faster accessibility to local files.
- Lower cost and more effective backup capability.
- Flexibility to adapt to future requirements or change.
- Higher costs due to duplication of hardware, software, data, space and people.
- More difficult management and control of operations, standards, application development and data bases.
- Restricted growth; i.e., CPU power, storage capacity and I/O device selection.
- Possible incompatibilities.
- Application size and complexity restrictions.
- Duplication of input, output and functions.

Figure VI-1

decentralized management over its own information systems requirements.

- The fact that control over information means greater political power — in Orwell's *1984* is noted the interlocking relationship between "history" and "he also controls the history books."
- The corporation and its organizational subentitles are increasingly dependent on data processing systems in such a way as to make availability and reliability critical issues in some industries (e.g., airlines).
- Data processing's growing percentage of total corporate budgets is causing corporations to seek means to optimize their (i.e., DP's) expenses while caring for and feeding this vital resource.
- Technological improvements and developments, (e.g., microprocessors, minicomputers and I/O devices) mean that smaller company organizational units can now afford their own computer, or at least sophisticated terminal systems with full processing capabilities.
- Communications costs have *not* dropped as rapidly as other technology performance-per-unit-of-cost areas (for example, micros, minis, etc.). Therefore, remote access to a centralized DP facility remains costly. (This fact alone, in many cases, represents one of the major causes or forces encouraging the current distributive processing and mini/micro phenomena.)
- Security of DP resources in times when centralized sites are possible targets of dissident groups is a factor in some decisions to distribute the corporation's nerve center and data bases.

Search for Definition

It would be foolhardy to suggest that we may provide an all-inclusive definition of distributive processing for reasons which are clear to the majority of the targets of today's purveyors of such systems. Each company marketing distributive data processing clearly touts products which are distinguished by both dramatic similarities and differences. Certainly distributive DP environments seem to have existed since the mid to late 50s in one form or another, if we include such hierarchically organized systems of hardware/software combines as found in the military, government and large (and/or financially substantial) companies.

Star or ring networks of processors linked by automatic communications (however rudimentary) have been commonplace for over 10 years now. Timesharing environments, supporting remote batch processors which are at the same time computer systems in their own right, would seem to fulfill today's distributive DP concept as well as we know it.

Could it be that distributive DP is not a product but a philosophy, the *commonplace* embodiment of which has been waiting for cheaper hardware, cheaper communications and better software to allow for a more productive sharing of these resources?

I say emphatically yes! Cheaper is here; its companion is, in my opinion, awaiting arrival of the "better software" component to grease the skids for widespread usage.

Similar Notions

In any event, similar to all distributive DP systems seems to be the notions of:

(1) Distribution of *functions* either *locally*, that is, internal to the computer design (e.g., I/O processors, front-end communications processors, etc.), or *remotely* through intelligent terminals which can perform some limited functions.

(2) Distribution of *processing*, that is, local or remote satellite computers, perhaps with a master-slave relationship between a satellite and the host (with or without their own I/O devices and data base).

(3) Distribution of *both processing and control*. Examples include the Arpanet, Univac distributed communications architecture and Control Data Corp. Cybernet systems, where no single host is in total control of the network and all computers within the network can control their own processes.

Three additional dimensions of distributive processing are operations, management and applications development, in the sense that some decision must be reached as to whether these functions should be centralized, decentralized or reflect some combination of the two. Solutions will vary from organization to organization, depending on many factors such as the structural nature of the organization — for example, is it multidivisional or not?

Another factor entering into the distributive processing issue is the logical structure of the applications segment(s) or function(s) to be performed. Are the tasks or functions mutually dependent or independent logical functions?

For example, inventory control systems, personnel systems, manufacturing control systems, order entry systems and accounts receivable or payable systems may be either totally independent or interdependent to a greater or lesser degree.

The logical relationship of the data bases — whether they are integrated or separate data bases — represents yet another controlling factor.

Clearly, the distributive processing decision demands a thorough, trade-off analysis which addresses the following issues (among others):

- The cost of accomplishing a desired processing or logical function.
- The time needed to develop and implement the process.
- The maintenance requirements, controls and standards relating to the process.
- The utility or relative priority of the function or process.
- The expected results and risks associated with a purely centralized, decentralized or distributed approach.

The accompanying table (Figure VI-1) lists some potential advantages and disadvantages associated with principally centralized or decentralized approaches. It is important to realize that this "shopping list" will carry greater or lesser weight depending on the industry or organization doing the shopping.

Clearly, one of the major trade-offs has to be in terms of people effectiveness or productivity vs. cost/performance or hardware efficiency. A company's decision has to be based not only on quantifiable factors, but also on more subjective, qualitative issues.

However, we can say that of all the constraints and factors involved, hardware represents one of the *least* important, whereas software and management issues are *very* significant, perhaps even paramount.

The IBM View

IBM sees distributive processing as potentially the best of both of the worlds of centralized and decentralized DP. If the corporate DP department and its end users are viewed as separate entities, then IBM's approach would seem to give end users more flexibility in defining and designing the systems they need while, at the same time, preserving the concept of overall corporate control over end-user activities.

IBM literature on the topic uses concepts and products (Systems Network Architecture, the 3790 intelligent terminal system and Series/1) which seem to support IBM's view of distributive processing as the best of both worlds. Not all customers share this view, but IBM's total product offering in this area is not yet fully visible.

IBM is not intentionally giving up the attractive minicomputer and distributive data processing market to its competitors (the long-anticipated "Peachtree" minicomputer was recently introduced as the Series/1). Indeed, it would behoove certain independent minicomputer and intelligent terminal vendors to study IBM's strategy and objectives more fully; to do otherwise could seriously compromise the profitability of these independents.

The main difference between IBM's approach to distributive processing and that of some of the other major competitors is that IBM apparently believes in *centralized host control* over the network of distributive systems, whereas other vendors, such as Burroughs, Univac, CDC and the minicomputer companies, such as Digital Equipment Corp., in particular, believe in distributed control within networked systems or "netted systems."

Honeywell's current position appears close to IBM's in this regard at this time but may, in fact, provide an intelligent compromise between the two. It is important to understand the distinction between these approaches.

IBM clearly is against the "distribution of control" on business principles; that is, it would like to integrate the host computer, the front end, the network processors and multiplexers, concentrators, remote intelligent controllers or satellite processors and terminals so each of these components and functions is ultimately dependent upon the IBM central host(s) facility.

This strategy frustrates the attempts of plug-compatible vendors to detach or penetrate the IBM customer base and, at the same time, ensures greater total system or network control, improved data security and system integrity and (naturally) greater revenues for IBM.

In contrast, most other major vendors cannot afford to be so restrictive.

Figure VI-1 presents a list of competing philosophy attributes which may be used to identify whether a system may be considered distributed or not. Clearly, it's an unclear issue!

Perhaps the final resolution of distributive DP or nondistributive DP rests in the paradox that "learning to live in two mutually exclusive yet coexisting realities is a necessary attribute of today's top DP manager."

Lecht is the author of four previous books on computer-related matters: The Programmer's Fortran II and IV, The Programmer's Algol, The Programmer's PL/I *and* The Management of Computer Programming Projects.

He is president of Advanced Computer Techniques Corp., which he founded in 1962, and has lectured widely for such groups as the Association for Computing Machinery, American Management Association, American Society for Information Science and Data Processing Management Association.

Editorials

NCC and Society

"DP management has an obligation to look into the state of the art because it will impact the primary force in our environment – people."

That's what Dr. Carl Hammer, director of computer sciences at Univac, said before a recent regional meeting of the Data Processing Management Association [CW, May 30].

And one would think that next week's National Computer Conference (NCC) would be a perfect opportunity to discuss the myriad social issues both affecting and effected by the computer industry and computer use.

But that's not the case.

Instead, the American Federation of Information Processing Societies (Afips), which sponsors the annual get-together, has arranged what appears to be a particularly vapid program.

There are only three or four sessions out of a total of B9 that bear any resemblance to the social issues facing the computer community – and, in most cases, those sessions only bear a tenuous relationship to those issues.

Furthermore, although the show is in a new area of the country for NCCs, there seems to be little attempt to get new speakers and new faces on the program. A first glance at the schedule indicates it will contain more of the same from past years instead of innovative and thought-provoking presentations.

Hopefully, we're going to be proven wrong when the NCC convenes, but we do feel Afips could have put together a more original and provocative package of technical sessions for what promises – at least in terms of Afips revenues – to be the most successful NCC yet.

Easing the Burden

The National Bureau of Standards (NBS) has been presented with a study that highlights some of the problems in detecting and correcting errors in computer information systems (see Page 1). End users should welcome the results of the study.

In this time of processors that operate in nanoseconds, it is important for the industry to veer away from its fixation on speed and to concentrate again upon product reliability.

As systems become increasingly complex, it is totally unreasonable to expect the end user to shoulder the entire burden of error detection and correction. Vendors must concentrate on giving the user a system with an unbroken checking trail.

Users must be given the tools to implement effective checking and correction programs. They should especially note the recommendations that manufacturers certify the degree of checking built into hardware and software.

Both users and manufacturers should agree it is the responsibility of the vendor to inform the prospective buyer whether checks are integrated to form an unbroken checking chain or whether some discontinuities exist.

The NBS should adopt the recommendations set forth in the study and implement the procedures necessary to establish the nomenclature and the standardization necessary to promote a commonality for error detection and correction.

'Forget It – You Grew Up on This Stuff!'

Letters to the Editor

Citibank's Decentralized Approach A Difficult Concept to Accept

As I read the article "Mainframes Not Always a Must, Citibank Officer Advises Users" [CW, May 16], I was reminded of a lecture I once attended on the subject of how not to design systems.

I cannot dispute the statement that Citibank's decentralized DP facilities have saved $80 million; but as a systems man, I find it difficult to accept the idea that "a raft of nonstandardized systems" made up of "equipment ranging from Burroughs to Wang, and just about everything in between" is any kind of substitute for a standardized, coherent and secure decentralized banking system.

Naturally, without the details, I feel somewhat uncomfortable criticizing Citibank's approach. However, there were statements quoted in the article about the problems encountered with its centralized system that clearly point to deficiencies in the systems design area.

First, there was the statement which said, in effect, that in the old system Citibank "undertook only two or three major projects per year. Of those, one failed and one was late." Most experts in the field list this problem as a major indicator of poor systems development techniques.

Also, it seems there were serious problems in the area of operations: "costs getting out of control," "backlogs growing" and "the system being too volume-sensitive."

As for the decentralized system, I am willing to bet that one good reason why people now have "no problem getting computer time" is that there are now 10 somewhat underutilized "toys" available for play.

However, what worries me the most is the problem of security. The article implied each "system" is autonomous. With today's worry over security and privacy of DP systems and the threat posed by the so-called "DP criminal," I cringe at the thought of a bank that has 10 computer facilities, each doing its own thing, with no central control.

I hope I am wrong in my understanding of Citibank's system; but, if I'm not, I respectfully suggest Citibank consider securing the services of a competent systems consultant to perform a computer center audit as soon as possible.

C. Victor Gouger Jr.
Concord, N.H.

Riding the Crest of Success

Charles Lecht's *The Waves of Change* is the best piece *Computerworld* has ever published. Encore!

Wm. Courington
Stanford, Calif.

Attack the Cause of the Problem

Alan Taylor has once again provided us with an awesomely detailed analysis of yet another of life's major problems – airline overbooking ["Airlines Make Advance With Overbooking Disclosure," CW, May 2].

And, once again, he has struck a mighty blow at the symptom rather than the cause of the problem.

Perhaps if the same amount of effort by Taylor and others were directed at those persons who make reservations and don't bother to cancel or keep them, we could deal more effectively with the cause of the problem.

The box accompanying his article would have been more appropriately titled "Airline Reservations: Keep Them or Cancel Them."

Robert S. Asquith
Palo Alto, Calif.

(Other letters on Page 30.)

Data Past

Five Years Ago
June 7, 1972

PHILADELPHIA – Univac introduced the 8460 disk storage subsystem, designed for users who needed large-capacity, on-line information files. Up to 2.2 billion characters of storage could be kept on-line and available in an average access time of 55 msec at an average transfer rate of 3M bit/sec.

– – –

WASHINGTON, D.C. – Senate probers investigated the operations of the Medical Information Bureau, which was said to maintain a computer-based data bank of health information on at least 11 million U.S. citizens.

Eight Years Ago
June 11, 1969

LOS ANGELES – Judge Robert W. Kenny of the Los Angeles Superior Court decided the Southern California Retailers Credit Service Co. had the legal right to assert a claim for $1 million punitive damages and over $2 million total damages against Statistical Tabulating Corp., a large commercial computerized service bureau.

The judge upheld Retailers Credit's right to punitive damages for the defendant's failure to deliver the credit company's customer files that were kept on magnetic tape and to deliver, in accordance with contractual agreement, the program developed by Statistical Tabulating to process the files.

– – –

NEW YORK – Programmatics said in court it was not in a financial position to outlast the effects of IBM's software policies. The firm said it might be completely destroyed unless IBM were forced to charge for its DOS Sort or withdraw it.

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31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
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70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other ____________________

Detach here, fold, and place in post-paid envelope attached through binding.

Low-Cost Systems Give Program Power to the People

By Jack Stone
Special to Computerworld

For years we have been subjected to science fiction stories in which Harry Homeowner and Henrietta Housewife are served by large-scale computing facilities that are packaged in wristwatch-like devices.

Although our industry has been incredibly successful at expanding computing capabilities while reducing costs and package size, there's still quite a way left to go before the ultraultramicrocomputer becomes a reality.

Yet, many of us believe it is only a matter of time before the majority of Americans are served by the family processor.

On the other hand, one wonders when (or if) the vast reaches of our population will (or should) have a programming facility.

There are, to be sure, market factors that are encouraging growth in this direction.

First, nearly all of the colleges and universities and most of the high schools teach programming in one form or another. Hopefully, this experience is a positive one for most students and will stimulate interest in carrying computer technology into the home.

Converting Skeptics

Second, the personal computing business is expanding rapidly in the consumer market, awakening new interest in computing from converted skeptics.

Third, the small business person has become vitally interested in computing machinery. If his or her experience has been successful, then we can expect moral support at least for family DP applications from this sector.

Finally, and perhaps the most important, the microcomputer vendors are just doing a first-rate job in merchandising small programmable machines with packaged software and introductory-level texts on programming. (If you haven't already done so, you must visit your local personal computing retailer and feast your eyes on some of the most spectacular technology around.)

Growing Fascination

I became fascinated with microprocessors during the design phase of a rather interesting training program I am currently implementing (and will report on in future columns) that deals with English-language DP training of Middle Eastern students whose English-language fluency is limited.

Suffice it to say here that such training is obviously extremely difficult and, to be effective at all, must incorporate the very best ideas in instructional strategies.

Although all of the students in the class have had some DP background, and several are skilled Cobol programmers, the program called for a review of DP systems from the very beginning to assure that all of the students understand DP concepts in the English-language context.

Naturally, I will use the full gamut of audio-visual materials and workbooks for both instructor-led and laboratory sessions of the program and on-line terminals for the Cobol training.

But as I pondered over the sections dealing with programming concepts, I felt that I needed instructional support that included some kind of new machine capability — one that was extremely limited in size, but demonstrated all of the basic programming concepts and techniques.

Deciding What to Demonstrate

So, I set about my task by asking the question: What do we really want to demonstrate in a basic programming concepts course? We want to start with elementary programs involving the basic arithmetic functions, certainly, and then proceed to chained calculations.

This subject naturally leads to the idea of algebraic hierarchy and showing the students how to handle algebraic expressions. We want to illustrate the handling of numbers in both fixed point and exponential forms.

Then, perhaps, the students should observe the use of the single variable functions such as common and natural logarithms, squares and square roots, integers and reciprocals and the trigonometric functions. It would also be desirable to show some more complex functions in action, such as raising a number to an arbitrary power and its inverse, means and standard deviations and polar/rectangular conversions.

The Human Connection

During the process of performing these calculations, the students would, of course, be introduced to the notions of input, accumulating register, process and output.

Now, we should be ready to proceed with more complex programming exercises. We should have the ability to address general-purpose registers and the facility to perform register-to-register arithmetic. We should give the students a reasonable main storage capability for program residence.

Also, the students should be able to interact with the machine system in the "hands-on" manner. Program execution should be in the interpretive mode, and the system should allow the student to control execution through single step or pause facilities.

The machine should have the capability to handle conditional and unconditional branching and subroutines. The instructional repertoire should be the minimum necessary to demonstrate these techniques and should require the absolute minimum coding.

The machine should be supported with a well-written user's guide, sample programs and, if possible, a primer on programming oriented to the machine.

Finally, the machine should arrive at the door for extremely low cost.

Well, my search was fruitful. I found a product that met nearly all of my needs.

The machine features include algebraic entry, algebraic heirarchy up to seven levels, 12-digit accuracy for mathematical calculations, fixed-point calculations displayed up to eight decimal places, numbers exponentiated to the 99th power, 10 data registers plus one accumulating register with display output.

Other features include 100-char. memory for program storage, variable-length instructions, 23 built-in functions, three unconditional and four conditional transfer instructions, two loop-control instructions and four levels of subroutines.

The system comes with a complete owner's manual, an applications library of 5 programs dealing with math, statistics, finance, electrical engineering, navigation, and a programming workbook for users with little or no previous experience.

This product, which now functions as my family's computer system, is the Texas Instruments, Inc. Key Programmable Slide-Rule Calculator, SR-56. I purchased it from that little electronics curio shop — next to the corner drugstore — for $79.95 complete.

Based on Four Files

Security Designs Let Applications Protect Themselves

Computer applications security is a major topic.

You can hardly open any trade paper without seeing references to how security keys, passwords, rings, authority structures, etc. are being used, or else to how futile they are in the face of growing computer crime worries.

The Taylor Report

By Alan Taylor, CDP

Yet, despite the interest that lots of people have, the idea seems to be how to protect any computer program, rather than how to design the program so it will protect itself.

Personally, I like the idea of having a program — or rather, application — protecting itself. The application, after all, knows much more about itself than any operating system designer does. This knowledge can find ways to guard against people attacking the application that can be quite ingenious, without being incredibly time-consuming.

Four Basic Files

The security design that can be installed as a subsystem of an application is based upon four files — three that are quite obvious and one that may be new.

The obvious files include the Expected Usage History File, the Unexpected Usage History File and the Authority for Unexpected Usage File.

The unobvious file that has to be developed in some form or another is the Rumor File.

The Expected Usage History File contains details of usage of the various key elements — both programs and files — that are expected to be direct or indirect targets of attack. This file retains some significant data regarding usage characteristics, volume of input, frequency of run, type of associated operations, nature of person who would authorize type of run, proper method of disposition of outputs, etc.

The data is kept separately for each of the expected usage categories and normally includes production, testing, modification, auditing, etc.

Unexpected History

The Unexpected History Usage File is developed by noting actual usage (from the machine logs) of any of the critical elements, after setting up the actual reports against the rules for the expected operations and finding activities that fall outside these areas.

Practically, of course, there are many reasons for unexpected operations. Hardware or software errors which cause a rerun, for instance, come immediately to mind. Peak-month or year-end operations may increase the usage of some on-line operation (which also can be monitored in the same way).

Whatever you immediately think are the limits of expected operations, you can be sure there are frequent other usages. All these appear in time and should then fall into the unexpected history file. This is then held for developing both a greater understanding about what is going on and also for improving the expected history file — going so far as to permit the expected usages to be checked against the actuals with comparative ease.

Result of File Comparison

Obviously, the Authority for Unexpected Usage File is the result of the comparison of the other two files with the authority known for the unexpected usage. These authorities can be the computer operator or the maintenance programmer. An authority does not have to be given ahead of the event because to do so is a frequntly impractical concept to follow in practice.

Practically, it will be found that many items cannot really be specifically authorized — such as a too-frequent use of some part of the program for "testing." Indeed, they don't need individual authorization.

However, when the pattern of usage is put together, there may be something unusual which, if it trips some application-developed criteria, can result in matters being included in an Unexpected and Unauthorized History Report.

Of course, there may be nothing at all wrong with the unexpected operations, but if it is a security effort and if the pattern is wrong, then someone should look at it. The application would be policing itself and doing it with knowledge of itself.

In policing its activity, some room for reasonable changes in activity volumes have to be given. Sometimes, however, certain areas can do with closer scrutiny than usual; that is where the Rumor File comes in.

The Rumor File

A major problem in our professional ethics is that because of the power and occurrence of computer crime and because of the various ways different professional people in an installation can see what is going on, there is the question of what to do when it appears there is something not quite right in operation.

On the one hand, as professionals, many codes ask us to keep absolutely confidential anything we learn or surmise about other applications. Yet, at the same time, other ethical codes call upon us to report to the appropriate authority anything which seems wrong.

The two concepts conflict, as the developers and commentators on professional ethics have frequently discovered. It is simply too late to wait until one is certain that something is going wrong, and it is equally wrong to rush in.

Just who is the "appropriate authority" when you wonder whether a systems design has been played with?

Solution to Conflict

The Rumor File for a particular application is a solution to this. It provides a method which can simply result in scrutiny being increased in certain areas after they have been pointed out to be acting in an unexpected way, which has drawn attention to them.

Access to the file can quite properly be anonymous — which solves the ethical problem — and the very name of the file means that no one expects the comments in an anonymous letter to be taken as gospel.

The Rumor File can itself be partially computerized. It is certainly a lot harder to trace usage of a console to put a message into a file where there are definite precautions to keep the file access (but not recovery) open, than it is to guess about the handwriting of a letter.

With such a system, we can solve the ethical problems and improve the danger of detection, thus discouraging improper operations and improving the security of the operation. That's quite a good result.

By doing it with an understanding of the application, it is also possible to keep the mass of work in the hands of the computer and keep the costs way down.

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To the executive who knows a DBMS is not a German sports car:

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Prime can help

Conflict Over Structured Methodology Goes On . . .

Reader Commentary

By Gopal Kapur
Special to Computerworld

During the past few years, a large number of conflicting articles have heen published on the subject of structured methodology. It all seems to have started with the paper by Dijkstra in the *Communications of ACM* (March 1968) entitled "GOTO Statements Considered Harmful."

This was followed with a paper by Knuth (Stanford University) who told us how to avoid GOTO statements in our programs (*Informatian Processing Letters*, February 1971).

These two articles caused a "bandwagon" syndrome as author after author wrote articles and books praising the glorious results of coded programs without GOTO statements.

These authors attempted to tell the reader that coding without any GOTO statements will surely emancipate the programmer from poorly designed programs, and all programs will become easy to read, easy to understand and easy to maintain.

The bubble was burst in 1974 when Knuth told us of ways to write structured programs with GOTO statements (STAN-CS74-416). And then there were the statements from many programming pundits (Association. of Computing Machinery [ACM] annual conference 1977; 1975; National Computer Conference [NCC] 1974, 1975 and 1976) that Dijkstra's paper on GOTO was grossly misinterpreted.

As if the discussion of GOTO and no GOTO did not cause enough confusion, there was the article expounding on the virtues of COME FROM . (Clark, *Datamation*, December 1973). There is still some speculation over whether the article was serious or tongue-in-cheek.

This was followed by "The 'Else' Must Go, Too" (Bloom, *Datamation*, May 1975).

I am breathlessly awaiting an article on 'Dynamic Sneak-By.'

Conflicting Views

Some have called structured methodology nothing but warmed-over modular programming while others huve dubbed it a revolution (McCracken, D.D., "Revolution in Programming: An Overview," *Datamation*, December 1973).

Added to these conflicting and often confusing viewpoints are the publications telling us that structured programming really means to rally around a superprogrammer (the chief programmer) and form teams, aided hy a backup programmer and a program librarian.

We have heen enlightened on the ways to achieve *programming nirvana:* create Hipo diagrams, write upteem levels of nested IF statements and communicate in Pidgin English.

Weinberg told us to forego our egos and walk through everybody's code (some severely scarred programmers dubbed the process a walk-on).

Then there is the imported (must-be-better) school telling us about how Warnier Bracket Diagrams and laws for construction of programs (LCP) are really where it's at. There are those who swear by Chapin Charts, others who swear at them while vigorously waving a copy of the Nassi-Schneiderman Charts (ACM Sigplan Notices, August 1973).

Buzzword Problems

Recently, a DP manager, harried after viewing an audio-visual presentation on structured methodology, called to ask what the terms "design heuristics," "program morphology," "skew-in and skew-out," "efferent" and "afferent" meant.

Why the coining of all these new buzzwords? he fumed. Are these people really concerned with helping develop a hetter methodology, or are they doing this to carve a nitch in the much-rumored Coding Hall of Fame (said to be located underground somewhere near Poughkeepsie).

In his disgust, he said, "They can take their heuristics, morphology, skews, nested IF and the like and GOTO..."

The entire programming profession is being beseiged, he said. In his opinion, "structured programming was nothing more than the social disease of DP ills."

IBM told us that the chief programmer team concept and structured programming really work and backed their claim by citing the *New York Times* project (F.T. Baker, chief programmer team management of production programming, *IBM System Jaurnal* 11,1, 1972; Systems Quality through Structured Programming, Proceedings of Afips 1972 FJCC).

These claims were of course questioned and, at times, even refuted as heing far from the truth (Edward Yourdan, Peter Denning, 1975 NCC panel discussion; "Rules Not Helpful All the Time," *CW*, June 4, 1975; "Who Said What to Wbum," *CW*, July 1975; Yourdan, "Letters to the Editor," *CW*, Nov. 12, 1975).

In the midst of these claims and counterclaims, there was the letter from three members of the *New York Times* declaring Baker's original claims to be somewhat self-serving and misleading. We were also told how the top-down approach was really better than the bottom-up approach (the *Kama Sutra* gives bottom-up a bit higher rating).

Confusion and Alarm

All of this caused much confusion and great alarm among programming groups and DP managers as the entire vocabulary of new words meant certain obsolesence. Not that the average programming shop is that hot on theoretical subjects to begin with.

The real mystery is why there is so little discussion anywhere on composite analysis as described by Myers. He is, in fact, about the only author who has quantified the criteria for evaluating the "goodness" of a program.

In my personal interviews with scores of programmers, analysts, project leaders and DP managers, it is apparent many have a misunderstanding of structured methodology. They occasionally hase their judgment on misconceptions and poor informution spewed out by the new (self-proclaimed) pundits who are often nothing more than oral flashers.

At times, there is even a subtle fear of this new methodology among experienced programmers and analysts. Some of the disadvantages cited are: lack of proper definition of the methodology; the need for additional personnel and increased computer resources to develop and test structured programs; unsuccessful structured walk-throughs; methodology that does not really fit their environment.

Some mentioned their department was too small, while others rejected it because their group was too large.

A large majority of the managers interviewed expressed a need to know the experiences of other departments who have tried structured methodology. They wanted to hear about the experiences of some nonbiased parties (other than vendor representatives, educational consulting firms, book publishers and in-house training coordinators).

Areas of Interest

They were interested in learning about other installations' experiences with structured design and structured programming, including design tools being used, workable standards and guidelines, productivity measurement methods, project estimating, progress reporting and work evaluation methods.

They wanted to know the effects of structured methodology on cost, quality und programmer attitude. They were interested in knowing the most effective ways to introduce structured methodology to their staff.

And then there is the perennial question: "Will it help us in our heavy maintenance environment?" Under these circumstances it is imperative that DP managers and practitioners develop a clear understanding of structured methodology's implications, advantages and disadvantages, and pitfalls.

Fall Conference Planned

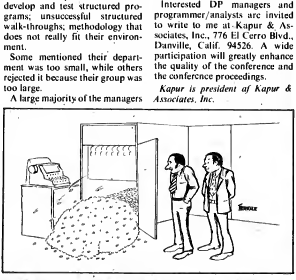
Plans for a conference sometime next fall are underway. The aim is to provide the DP professionals with a complete and objective analysis and evaluation of structured methodology as used by the business DP community.

Conference topics will include:

- Definition of the methodology and techniques in use.
- Usefulness of various components and tools of structured methodology.
- Advantages and disadvantages as experienced hy users.
- Effects (pro and con) of structured methodology on programming activity and programmers.
- Effective methods of introducing structured methodology to the programming, analyst and supervisory staff.
- Present and future trends in the develoment of structured methodology.

Interested DP managers and programmer/analysts are invited to write to me at Kapur & Associates, Inc., 776 El Cerro Blvd., Danville, Calif. 94526. A wide participation will greatly enhance the quality of the conference and the conference proceedings.

Kapur is president af Kapur & Associates, Inc.



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Reader Commentary

The Other Side of the Argument

Proposed I/O Interface Standard Will Hurt Innovation

By Herman Lukoff
Special to Computerworld

The May 2 editorial that stated the mainframe manufacturers are acting to suppress the proposed I/O interface standard cannot go unanswered. *Computerworld* presented only one side of the issue. Some of the facets of the other side are discussed below.

The Computer & Communications Industry Association (CCIA) is attempting to prove that technical innovation will not be stifled because:

1. IBM has been using the proposed standard interface since 1963 and is still using the same interface on the firm's latest equipment.

Response: The 3033 CPU is a plug-compatible replacement for an earlier model machine. Compatibility requirements force use of the same interface.

IBM provides no guarantees that future product lines will use the same interface.

2. Amdahl and Cray Research have built advanced machines using the interface and have not been stifled.

Response: Amdahl has targeted its CPU to be a plug-compatible replacement for an IBM mainframe. Obviously, the IBM interface would have to be used. The Cray machine is a "number cruncher" and all resources have been committed to speeding up the CPU.

The point is that some smaller mainframe companies are willing to devote their limited resources to improving one aspect of the system—the CPU—and ignore I/O performance. With a fixed I/O interface, it is indeed possible to innovate faster processors, but this is of minor interest to the majority of DP users who are I/O-limited.

3. The AS series of computers from Itel Corp. use the standard interface.

Response: These mainframes are targeted toward direct replacement of IBM mainframes and obviously have to use the same interface. They represent little in the way of innovation.

4. The Univac 90 series also employs the same I/O channel with minute modifications.

Response: This is true. Univac is strongly against standardizing on the interface, even though it would cost little in design efforts to do so.

Con Arguments

The CCIA hasn't proven a thing with the examples cited, The arguments against standardizing the I/O interface are as follows:

- The interface is 14 years old. This period covers several generations of computer systems.

Data rates through the I/O channel have increased by an order of magnitude or more. The interface has served well during this period and has been able to keep up to needs through improvements and additions to the channel.

But these types of improvements can only be carried so far before other problems appear and become a limiting factor.

For example, the overhead functions in the interface will become unbearable in the future. The handshaking takes too great a proportion of the data transfer time. The fact that the interface has held forth for 14 years provides no guarantees that it is adequate for the future.

- The I/O interface is embedded in the very heart of our computer architecture. The CPU and memory are separated from the I/O control units by the I/O interface. Systems performance is measured by throughput, that is, the ability of the entire system to do a customer's job, and this is obtained by balancing the mainframe and I/O capabilities.

New architectures consider the trade-offs of placing functions in the CPU vs. placing them in the I/O. The trend, in fact, is to unload the CPU as much as possible by putting more intelligence into the I/O control units.

To reduce costs for the user's benefit in smaller systems, the tendency is to eliminate the channel interface completely by integrating the control into the CPU. In very high performance I/O, we wish to design special channels that operate at high speeds and greatly reduce the time wasted in channel "handshaking."

With the event of distributed processing looming on the horizon, we may want to provide quite different functions in the I/O control units.

Optical fiber data links now verge on practicality. The great benefits in optical data links are achieved by using a serial channel and not the parallel paths used in the proposed standard.

By standardizing on the I/O interface, such innovations discussed above are greatly impeded—if not eliminated altogether.

Once the signals and functions on the I/O interface are frozen, the die is cast for continuing present I/O architecture, with only small improvements likely.

Same Transmission

In layman's terms, standardizing on the I/O interface would be the equivalent of saying all automobiles have to use the same transmission. This would directly prevent the automobile manufacturers from providing trade-offs in the transport system between engine performance, drive shaft and differential gear ratios and wheel design.

The transmission can be thought of as the I/O interface between the drive shaft, differential and wheels (output devices) and the engine (CPU).

No one has directed such standardization toward the "innards" of an automobile. Instead, such standardization has occurred at the periphery of the automobile where easy interfaces exist—the battery, tires, lights and fuel supply.

The I/O interfaces embedded deep in the computer system between the channels in the CPU and the control units have been the target for standardization only because they are digital and relatively easy to describe. The far more logical point of standardization is at the peripheral devices, but these have difficult analog interfaces in many cases, and the risk of unsuccessful interconnection is high.

- While it is true that there would be greater competition and lower prices to the user with I/O interface standardization, such gains are relatively small and shortsighted. Competition might bring about immediate savings of 15% or so compared with order-of-magnitude reductions in cost that technology can bring.

A quick reference to the cost per bit of disk storage shows such dramatic reductions in cost over a relatively short period.

PCMs Flourishing

- While there has been no official I/Q interface standard, this has not stopped the plug-compatible manufacturers' (PCM) market from flourishing. PCM peripherals have been developed for all the mainframe manufacturers' systems, but IBM, commanding the lion's share of the market, has obviously been the prime target.

No one is stopping the PCMs from second sourcing if they have the ability to do so.

- The establishment of the I/O interface will freeze the control unit and peripheral area for a longer period, making it easier to copy.

With potential for higher volume, the area will look particularly attractive to foreign manufacturers, especially those in Japan which have the expertise and may readily undersell American manufacturers.

The computer industry can well be moved offshore by the standardizing action. It has happened with television to such an extent that the U.S. and Japan are now negotiating a trade agreement to limit imports.

- The suggestion that mainframe manufacturers get together and standardize on a new interface is not a practical recommendation.

The reasons are stated in the argument above that the I/O interface is embedded in the very heart of our new systems architecture and such innovation constitutes confidential information — trade secrets — that lead to technical competition and competitive advantage, all to the ultimate benefit of the user.

I/O interface specifications cannot be derived in a vacuum—that is, by having manufacturers get together at a meeting. The I/O is an intricate part of a systems design that must be defined early in the design cycle, which can easily extend for five years.

The chances of having all mainframe vendors synchronized to start a major systems design cycle are very small. Further, what is optimal for one mainframe vendor will not be optimal for another.

- Arguments have been advanced that the proposed I/O standard interface will only be required as a minimum; other innovative I/O interfaces can coexist.

Why should mainframers complain about stifling technology if this is the case?

The existence of two I/O interfaces in a system presents a compromise. It costs something to allow for the interface even if it is not used.

The costs are not insignificant; thus, the cost to the customer who needs only one interface must be higher. IBM, if it decides to continue with the one interface, would have a decided advantage over other manufacturers, which would have to have two.

Also, how long would the government agencies forced to use the standard continue to do so when superior performance would be achieved with the nonstandard interface already on their premises?

The above arguments aren't going to convince some in the CCIA, but it may help convince the intelligent computer user that technological innovation will buy him more in the long run.

Finally, the statement is made, "The real reason the mainframers do not want a standard is so they can better control their users and make sure those users purchase peripheral units only from the

(Continued on Page 30)

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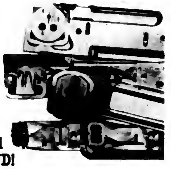

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Letters to the Editor

NCR Has Not Yet Requested Validation for Its Compiler

The first article in the Cobol on minis series ["Growth of Cobol: Signal of Trend to Distributed DP?", CW, April 25] contained a minor misquote regarding NCR Corp.'s 8200 Cobol '74 compiler.

The statement "categorized by the government as a low-intermediate implementation" should have been more properly stated as "targeted by NCR to meet the low-intermediate level of implementation as specified by the Federal Information Processing Standards (Fips)."

In order to be "categorized" by the government, an individual or company must request formal validation from the Federal Cobol Compiler Testing Services for a specific Fips level of implementation (e.g., low-intermediate).

NCR has not yet requested such validation for the 8200 Cobol compiler.

J. Keith Lohmuller
Director, Eastern Division-Field Support
NCR Corp.
Dayton, Ohio

Issue Extraordinaire

I have always thought *Computerworld* was the greatest, but the April 25 issue was superb.

I would like to see more articles like "'Report Writer' Reduces Coding, Debugging Activities" and "Syncsort or SM-1? Differences Difficult to Evaluate," in addition to other articles that are a definite aid to keeping the professional programmer informed.

Gabe Gargiulo
East Hartford, Conn.

All Lawsuits Important

The report on the Mt. Diablo School District trial in Concord, Calif. ["Mt. Diablo Awaiting Verdict on IBM 370," CW, April 25] attempted to put a perspective on how important IBM views the case. In this connection, the article stated "an IBM spokesman indicated the plaintiff's remedy of making the computer system sale null and void is unfair and inappropriate."

The fact is, we answered the questions this way: "In terms of dollars and cents, the remedy the plaintiff is looking for is that the computer sale be made null and void and IBM return whatever money it has received. IBM considers any lawsuit in which it is involved to be important."

When asked, "How important is a school board case compared to, for example, the Justice Department case?" our spokesman said, "We're not going to make that kind of comparison. We just feel that all lawsuits are important."

J.R. Young
Director of Communications
IBM
Armonk, New York

Problem Could Be Prevented

I would like to register some comments about "Seattle Bank 'Resolves' Operating System Conflicts" [CW, April 25].

First, the problem revolving around the bank's shared direct access storage device (DASD) environment should never have occurred. At IPL time, the systems programmer should institute automatic vary off-lines of all spindles known to be in possible use by the other operating system.

In addition, as IBM clearly stated, in a shared DASD environment, volumes should be indicated as reserved on both systems or reserved on one and off-line to the other. These are standard operating procedures in a shared DASD environment.

Harvey Karp
Ardsley, N.Y.

The Poetry of Programming

The following is a fragment found in a rolltop desk which I recently bought at the bankruptcy sale of a small software firm in Gnawbone, Ind.

The handwriting seems to be that of the Rev. Charles Dodgson, alias Lewis Carroll, who wrote *Alice's Adventures in Wonderland* and other treatises on mathematical logic. Chemical analysis dates the paper between 1870 and 1880.

This suggests that the controversy over structured programming is much older than was formerly thought.

The Coding of the Snark

He had drawn a large flowchart depicting the code
The development team were to write;
And the team were much pleased when they found it to be
A programming wizard's delight.
"What's the use of these CALLS, or the IF-THEN-ELSE clause,
Coefficients of binding, or DOs?"
So the team leader cried, and the members replied,
"GOTO goes wherever we choose!"
"This structuring stuff is pleasant enough,
But it takes all the fun from our jobs;
This flowchart's, we'll bet, the most challenging yet:
Just a tangle of arrows and blobs!"

Jonathan Sachs
Big Sur, Calif.

Standard Will Harm Innovation

(Continued from Page 30)

original manufacturer."

This statement promotes sinister visions of the big bad mainframe manufacturers conspiring to lock out the poor, innocent PCMs. It should be noted that Univac, IBM and probably other mainframers have policies which permit attachment of PCM devices at the user's risk.

The PCMs have not been locked out. The fact that they complain because the huge investment in design specifications is not given to them gratis on a silver platter is another matter.

The user who stays with the mainframe manufacturers for his complete system needs pays a little more, but is also guaranteed the integrity of the system. There is no divided responsibility when it comes to determining whether the data path errors are in the peripheral, I/O, channel, CPU or memory. The situation of one maintenance man blaming the other manufacturer's equipment is avoided.

Ford builds the whole car and sells it to the customer. You can't buy it without a Ford transmission, nor would it be a good idea to do so even if it were possible.

I hope CW readers will now understand some of the arguments against I/O interface standardization. The picture presented by the CCIA is a very unbalanced one.

Certainly the arguments for standardization in general are strong. But there are places where standardization is desirable and places where standards are bad.

The I/O interface is such a place. Far be it from me to argue against standardization — the Univac standards organization is one of my responsibilities.

Univac is recognized for its pioneering in the development of computer standards. The early work in standardizing higher level languages attests to our commitment to support standards that have a positive effect on the user, and we believe firmly in standardizing in the areas where it makes good sense to do so.

Lukoff is director of technical operations at Univac in Blue Bell, Pa.

More Products Reopen World of DOS Enhancements

● Eight Partitions Run With 'DOS/RS'

SCHILLER PARK, Ill. — Support for eight batch job partitions, two "special purpose" partitions and two subtasks are among the capabilities of Version 7 of DOS/Real Storage (DOS/RS), now available from Dearborn Computer Leasing Co., according to a spokesman.

That represents an increase of five batch partitions compared with DOS/RS Version 6, the spokesman said. It gives users of this operating system more flexibility than they would have under IBM's DOS/VS Release 34 or its companion Advanced Functions package [CW, May 9].

Flexibility comes from more than just the additional partitions, the spokesman noted. DOS/RS batch partitions are predefined, but may be reorganized dynamically into larger areas to accommodate big programs.

After the "problem" program is done, the partitions regain their individual sizes without any operator intervention, he said.

The "special purpose" partitions handle ongoing operations, such as spooling and teleprocessing.

The updated software also includes a Direct Access Storage Device Space Management feature. This provides dynamic allocations of space for new files and release of unused space at the end of processing on public volumes, the firm said. A data set catalog is also included.

To limit the space taken up by redundant coding in each partition, Version 7 has a Shared Access Method feature which provides a set of resident read-only shared I/O modules which can be used by any partition, the spokesman added.

An improved Scheduler has been built into the software, he continued.

This subsystem is responsible for the creation and later teardown of the multiple partition regions under which DOS/RS can handle large jobs without having to waste core on large partitions which are usually underutilized, the spokesman explained.

Facilities carried over from earlier versions of DOS/RS include support for IBM 3270 CRTs in place of 1052 typewriters as system consoles, for coupling two CPUs sharing a systems pack and other data files and for a generic ASSIGN facility.

Version 7 of DOS/RS is available under lease plans ranging from $700/mo for 12 months to $500/mo for 36 months. Dearborn is located at 4849 N. Scott St., Suite 401, Schiller Park, Ill. 60176.

● 'Grasp-Dox' Aids Console Use

BURLINGAME, Calif. — Grasp-DOX from Software Design, Inc. (SDI) is said to provide enhancements aimed at better utilization of a DOS or DOS/VS system's operator console.

It can be used as a stand-alone product or in conjunction with SDI's Grasp or GraspVS, according to a spokesman.

With the minimum configuration, all messages displayed on the operator's console are printed on the SYSLST printer at the end of job (EOJ).

This means each job has Syslog information on console messages printed along with the job control statements, and each message is time stamped for later reference, the spokesman noted.

The package also supports console spooling, deferred response and a "look-ahead-read" facility. The console spooling is similar to conventional spooling for printers and readers, he said, but it also allows the operator to defer responses to messages without "locking up" the console for jobs that need no response.

The "look-ahead-read," in effect, provides a capability that is the reverse of the deferred response. It allows the user to enter responses in anticipation of messages from the system, the spokesman indicated.

In what the vendor calls the most comprehensive feature of Grasp-DOX, the user is able to replace the IBM 1052 console typewriter with a 3277 CRT and a light pen attachment, if desired.

Seven CRTs can be locally attached to the system under this Grasp-DOX capability and three modes of display are available. One screen at a time is designated as the operator console screen; the others may be "console display" or "manager display" screen, the spokesman explained.

In operator console or console display mode, the CRT screen is split horizontally, with the top half displaying Syslog output and the most recent two lines of each partition. The bottom lines are reversed for operator replies and status information.

Each of the screens under this feature is independent of the others and can be frozen or rolled back without affecting system operations, he noted.

If the DOX features are added to a Grasp or Grasp VS system, the operator display screens can be used for job and data input.

The stand-alone Grasp-DOX costs from $140/mo, SDI said from 880 Mitten Road, Burlingame, Calif. 94010.

Users Facing New Decisions

By Don Leavitt
Of the CW Staff

To call the products on this page "responses to IBM's DOS/VS Release 34" [CW, May 9] suggests the vendors involved hadn't done anything in development until IBM made its announcements. It also suggests these products compete with IBM's offerings.

Both of these ideas are, in one sense, untrue and obviously unfair to the vendors; just as it was unfair to tag The Computer Software Co.'s Edos/VS [CW, May 16] as the first response to Release 34.

The fact is all of these products — and IBM's latest DOS/VS and its companion Advanced Functions package as well — have been taking shape for a long time. They go back, one way or another, to IBM's "functional stabilization" of DOS/360 with Release 26 in early 1972.

Even IBM recognized that wasn't the end of enhancements to its DOS: It just shifted the focus of its updates to the 370 environment.

The independent vendors — and many users — have obviously decided the 360 is still a pretty good piece of equipment. They've also determined there is no need to shift from an essentially DOS setting to gain many of the benefits of the much larger OS supervisor.

Up till now, however, these vendors have had a problem: They had to charge users for their software whereas IBM was giving away its updates of DOS.

IBM's DOS/VS Release 34 has little in the way of upgraded features compared with Release 33. But the company has made a whole collection of Advanced Functions available to the 370 user — for a price.

Ironically, then, it's not too far out of line to suggest IBM's announcements are responses to the reality of the market the independents have created, and not the other way around.

In any case, users now have a new environment; for any real enhancements to their operating system, they're going to have to pay someone.

● Itel 'Release 34' Ready in the Fall

SAN FRANCISCO — Itel Corp. is unbundling and upgrading the implementation of DOS/VS it has developed for users of IBM 360s and non-virtual 370s.

Acquisition of a mainframe or peripherals from the leasing company is no longer a prerequisite for getting the software that makes IBM DOS/VS-like facilities available on the older equipment, according to a spokesman.

Itel introduced its first non-virtual version of IBM's DOS/VS three years ago with a package that provided IBM Release 28 capabilities. Updates have generally kept pace with IBM's releases and the company expects to have its response to IBM's Release 34 [CW, May 9] ready in September.

Basic and Enhanced Features

Itel's basic DOS/VS includes support for five partitions, a relocating loader, a procedure library and variable partition priorities. It can handle multiple tasks, rotational position sensing (RPS) and supervisor selection at IPL time.

The company's separately priced DOS/-VS Retrofit Enhancements and Maximization Services (Dreams) package extends the backing to include eight real partitions, partition balancing, extended use of 3277 CRTs in place of 1052 typewrites as consoles and dynamic device switching.

IBM's Advanced Functions package extending the mainframer's Release 34 — for virtual 370s only — supports partition balancing and the simple use of 3277s as consoles, but provides only six or seven virtual partitions and does not provide any dynamic device switching, Itel stated.

Itel's DOS/VS already has support for peripherals compatible with IBM's 3330 running on 360/40s, -50s and -65s, as well as on nonvirtual 370/155s. The company also has its 3330-11-compatible 7300-11 running on 360s, the spokesman noted.

IBM 3340s will run with Itel's "Release 33" on the nonvirtual 370/155 and backing for Itel's 7330-12 (IBM 3350-compatible) units will be available for 360/65s and 370/155s with the "Release 34" version in the fall, he said.

Prices for the basic DOS/VS start at $700/mo. The Dreams features are separately priced, but the entire package is available for an additional $275/mo, Itel said from One Embarcadero Center, San Franciseo, Calif. 94111.

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CDC's 'Pallas' and Consulting Service Help Firms Work With Government

MINNEAPOLIS — Software designed to broaden the use of computer technology by law firms and corporations involved in civil or antitrust litigation has been installed on the Cybernet remote-computing network, according to the network vendor, Control Data Corp.

At the same time, CDC's Information Services has announced a consulting service to help business organizations use in-house systems to comply with the growing array of government regulations requiring extensive recordkeeping.

The Cybernet-based software, called Pallas, allows for the storage of complete texts of depositions, contracts, correspondence and similar documentation as well as statistical data, a spokesman explained.

It enables users, not necessarily trained in DP, to search large files by subject matter or data value to retrieve pertinent material quickly, he added.

Aids Regulation Compliance

The consulting service was intended to help computer users comply with the rules and regulations promulgated by such agencies as the Federal Trade Commission, the Equal Employment Opportunity Commission and the Environmental Protection Agency, the spokesman noted.

CDC has 50 full-time paralegal specialists — "augmented by part-time employees as needed" — to provide this support, he said. It is available on an hourly fee basis.

More information about Cybernet can be obtained from CDC, Box O, Minneapolis, Minn. 55440.

Package Prints Console Record

FAIRFIELD, N.J. — The Logout package, now available from Macro4, Inc., was designed to permit IBM DOS and DOS/VS installations to tailor their console logs and to print all or parts of the logs on line printers at end-of-job (EOJ).

Logout accumulates console messages and responses in main memory and reproduces them for each partition on the printer at EOJ, the vendor explained

The user may specify selective printing of the logs or define the tasks from which the logs are to be stored and printed, a spokesman added.

By moving log messages to the line printer, Logout is said to save user sites the cost of multiple-part console typewriter paper, to improve programmer productivity and to enhance service levels, especially to terminal users.

Multipart paper has traditionally been required so messages of value to personnel outside the operations area could be sent to them without destroying the basic log, the spokesman indicated.

With the EOJ printer output, users can print once on multipart paper or repeatedly on single-ply paper, if that is all that is available, the spokesman suggested.

The package costs $90/mo on a 12-month lease. It can be ordered from Macro4, Inc. at Gothic Plaza, 376 Hollywood, Fairfield, N.J. 07006. or from the company's offices in London, England.

Cleveland Considers Capacity

CLEVELAND — Donald C. Harder, developer of the Capacity Curve for evaluating computer performance, will be the featured speaker at a computer measurement workshop sponsored by the Cleveland Engineering Society on June 16.

The day-long session will cover productivity and capacity definitions that apply regardless of the computer installed, Harder said. Attendees will have the opportunity to use the definitions in practice exercises.

Senior analysts with duties in capacity planning should benefit most, but those people concerned with "exploring, starting, funding or managing" a performance program would also gain from the seminar, a spokesman stated.

The registration fee of $185 includes lunch, he added. For more information, contact the society at 3100 Chester Ave., Cleveland, Ohio 44114.

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All our terminals have plug-in character sets to cover a wide range of computer languages. And a plug-in Forms Drawing option lets you generate almost any form your company uses.

Our smartest terminals let you plug in fully integrated mass storage. This takes the form of twin cartridges, each able to store up to 110,000 bytes of data or programs.

You can use this information locally (the terminal's "soft keys" save a lot of time and effort on off-line jobs) or transmit it to your central computer.

Another new terminal, the ultimate "have-it-your-way" design, should be extremely popular with OEMs. You can pick and choose from a variety of hardware modules, and write your own firmware. Everything plugs together for a virtually custom display station.

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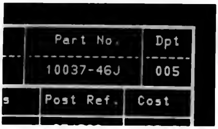

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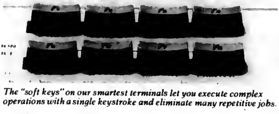
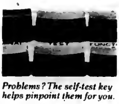


The "soft keys" on our smartest terminals let you execute complex operations with a single keystroke and eliminate many repetitive jobs.



Problems? The self-test key helps pinpoint them for you.

Measurement Series Extended

CHICAGO — Share, Inc., the IBM users group, has published Volume IV of its selected papers on computer measurement and evaluation (CME), covering the period of March 1976 to September 1976.

The 773-page book includes articles on virtual operating systems, mass storage devices, computer performance management and planning and forecasting, according to a spokesman.

Other subjects range from both software and hardware monitors through SMF and other accounting systems, he said.

A limited number of copies of Volume II and III, representing project publications from November 1971 to March 1975, are still available. Volume I, covering earlier writings, is out of stock and unavailable, the spokesman added.

Volume IV costs $25. Volume II and III contain a total of 1,580 pages and can be ordered for a discounted cost of $30 for the pair from Share, Inc., 111 E. Wacker Drive, Chicago, Ill. 60601.

With 'Ellipse'

1130 Software Runs on DG Gear

ROCKVILLE, Md. — The Eleven-Thirty Information Processing System (Ellipse) from Icon Corp. reportedly enables users of Data General Corp. Nova/-Eclipse hardware to use virtually any software that runs on IBM's 1130 processors.

The package allows DG disk-based systems to run IBM's Disk Monitor—Version 2 under Rdos, Mapped Rdos or the Advanced Operating System (AOS) "making the host computer bilingual," according to Icon.

With Ellipse in place, DG Ascii files are "completely interchangeable" with IBM Ebcdic files, a spokesman claimed. In addition, the 1130 devices are interchangeable with DG devices or logical files.

Current DG users contemplating a move from IBM 1130s can use a great deal of software, which has been thoroughly exercised and debugged, he noted.

Ellipse offers users access to language processors developed on the 1130, including Cobol, Fortran IV, RPG, APL, Cogo "and literally a thousand" application programs including ones for Pert charts, photocomposition, stress analysis and graphics, the spokesman said.

Business operations including accounts receivable and payable and inventory control are also available, he added.

The company maintains a large library of 1130 programs and a number of these are provided with the interfacing software.

Ellipse runs on any 32K or larger DG CPU, the spokesman said. The basic package costs $5,000.

Icon is at Suite 10 NE, 11300 Rockville Pike, Rockville, Md. 20852.

Data Bases Gain User Acceptance

PENNSAUKEN, N.J. — Commercial information banks—available on a number of remote-computer service networks—are back in favor "after nearly a decade of being overshadowed by in-house data bases", according to a study by Auerbach Publishers.

Users have recognized it is economically unrealistic to maintain specialized data bases of their own, especially if the bases are "multi-various collections of information that is outside the realm of standard business data," the study reported.

There are both passive and active information banks available, the study added.

"Passive" banks are large collections of information which a user can search for answers to questions made up of key words, while "active" banks act on the data and, in many cases, require input from the user for building in a formula or model, Auerbach explained.

Commercially available information banks can provide facts on agriculture, airplanes, banking, insurance, libraries, medicine, social science, technology and transportation, for a cost of pennies compared with the millions of dollars some companies have put into building and maintaining their own data banks.

Commercially Available Information Banks on the Rebound, discusses the cost factors which should be considered when subscribing to a commercial information bank.

It costs $15 from Auerbach at 6560 North Park Drive, Pennsauken, N.J. 08109.

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The HP 2640N is fluent in Danish or Norwegian.

The HP 2645S completes our Scandinavian coverage with Swedish or Finnish.

The HP 2645R. Designed for an application in Iraq, this model enters Arabic characters from right to left. It also works from left to right for standard computer languages.

The HP 2645A Display Station. Our smartest terminal, it can transmit at rates up to 9600 baud, has a forms mode, user definable "soft keys," and optional fully integrated mass storage. A very intelligent choice.

The HP 2641A APL Display Station. This is modeled after the 2645A, but also includes a full 128 character APL set, plus an APL 64 character overstrike set.

The HP 2649A Mainframe Terminal. This data station is ideal for OEMs. It lets you design custom firmware for your special application and pick the hardware modules your system demands. Available with all of the 2645A's advanced features.

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Move to Data Base Requires Changes in Philosophy

By Stephen L. Robinson
Special to Computerworld

Data Base Corner

Most DP people associate data base systems with revolutionary ways to store, retrieve and relate records. What is often not recognized is that a transition to the data base system philosophy of data organization requires a concomitant change in systems philosophy.

By systems philosophy, we mean the basic logic of application programs. Extended outward; since application programs reflect business system logic, we are talking about basic changes in the way organizations do business.

In order to understand the necessity for considering such revolutionary changes in business systems, we must consider the history of many contemporary DP systems.

Many years ago, when IBM was primarily a manufacturer of electronic accounting machines (EAM), many organizations made their first venture into automation. The "systems analysis" of such projects was done primarily by EAM experts, not business experts, thereby setting an unfortunate precedent which still plagues us today.

The EAM "systems" were, of course, mostly of the form shown in Figure 1. The print routines of such systems were typically of the form shown in Figure 2.

The fact that many existing business procedures did not conform to figures 1 and 2 did not deter the systems analysts. Since EAM was, after all, a new technology, the fledgling DP industry usually prevailed and new business systems and procedures evolved.

It should be noted that frequently the business people were quite unhappy with the new systems logic, but the "efficiency" of the new systems often carried the day.

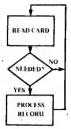

Figure 1

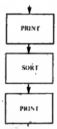

Figure 2

With the advent of second-generation tape systems, it would have been possible to conduct new systems analyses. Since tapes were sequential devices, however, the easy way out was to simply employ the EAM system logic for the second generation of computer hardware.

Third-generation hardware arrived, including wonderful random-access disks. Unfortunately (from a systems viewpoint), software and hardware support was provided to make third-generation hardware look like second-generation hardware.

With sequential access methods to make disks look like tapes and emulation to make IBM 360s look like 1401s, very little new systems analysis was done. Even new systems were not safe from archaic systems design.

Analysts and programmers, to an alarming degree, did not make the transition to the third generation; they were still designing and implementing second-generation (EAM) systems.

And so we march bravely forward into data base systems. But funny things are happening in this new world. Many data base packages, horror of horrors, do not support physically sequential files.

Oh, sure, they provide logical sequential processing (in which the records of a file, although not in physical sequence on a disk, can be retrieved in a logical sequence), but the inefficiency of such an approach for a large file can be quite substantial.

Some users of data base packages are spinning off files und sorting them. Their system and program logic end up being identical to the EAM logic displayed in figures 1 and 2. Indeed, it is rather interesting how many "data base systems" employ 80-character records.

What is clearly needed is a reintroduction of systems analysis procedures into DP projects. Such analysis should be done by two types of analysts:

- Business analysts, who are familiar with the functional requirements of an area being considered for data base development.
- Data base (computer) analysts, who are familiar with the capabilities and characteristics of computer hardware and peripherals, the data base package being employed by their organization and other available software (e.g., teleprocessing packages, data dictionaries, etc.).

Despite the temptation to do so, studying the overall logic of existing systems should be avoided during the assessment of the new system requirements.

It should be noted that a study of present systems is required in order to facilitate the transition process. However, this study should not initially impact the design of new systems. Later, transition logic may force a dual study.

Business analysts should be free to develop system logic that corresponds to the way the end users would like to operate, not the way they have been forced to operate by existing DP systems.

At the present time, the most advanced facet of the DP world is hardware. Software is lagging by a generation or less, but systems are lagging by two generations. It is up to the designers of data base systems to tighten the gap.

NTIS Book Outlines World of Standards

SPRINGFIELD, Va. — The second edition of *The World of EDP Standards*, now available from the National Technical Information Service (NTIS), describes the activities and the relationships of the many organizations and individuals involved at the national, regional and international levels in the development of standards for computers and information processing.

Written by Marjorie F. Hill and Josephine L. Walkowicz and published by the National Bureau of Standards, the 156-page book includes each organization's history, objectives, membership, structure, finances, relationships to other organizations and technical work.

Cataloged by NTIS as PB-263 771/8WC, the update of Hill's original book can be ordered in paper (for $6.75) or on microfiche (for $3) from the service at 5285 Port Royal Road, Springfield, Va. 22161.

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COMMUNICATIONS

Integrates CCITT X.25 Protocol

Telenet Unveils Micro Concentrators for Packet Net

WASHINGTON, D.C. — Telenet Communications Corp. has unveiled a family of intelligent communications processors based on microcomputer technology for its public data packet network.

Several of the micro-based systems, called Telenet processors (TP), were designed to permit users' computers and terminals to plug into the network without any hardware or software changes.

One of these processors will incorporate the CCITT's X.25 international packet switching protocol, according to a spokeswoman.

The specialized common carrier intends to incorporate the TP systems into the network itself as packet switches and data concentrators, pushing the network into a third-generation architecture, she explained.

The new architecture will result in improved cost performance and services and higher reliability than has been available in any previous packet network, the spokeswoman claimed.

Installation of the equipment within the network will begin this year and, by 1979, TP nodes are scheduled to be installed in more than 100 U.S. cities.

Two of the processors — the TP-1000 and TP-2000 — were planned for on-site customer use in the third quarter of 1977, the spokeswoman noted.

TP-1000 System

The TP-1000 is a host CPU and terminal interface processor interface to the Telenet public packet network.

As a host interface concentrator, TP-1000 was designed for the user who needs to support only a few asynchronous terminals simultaneously, but who wants the same error control and reliability available to large network users, the spokeswoman explained.

In remote locations where there are terminal clusters, the TP-1000 functions as a terminal interface concentrator.

In either situation; it is plug-compatible with Bell 103 or 113 series or equivalent modems and requires no software changes in the host computer, communications control unit or terminal devices connected to it, the spokeswoman claimed.

Telenet also designed the TP-1000 to operate for extended periods in an unmanned environment. Component modularity and single-card construction combine to minimize hardware failures and to permit unit replacements if a failure should occur the carrier claimed.

Telenet said it assumes all responsibility for installation, check out and maintenance of the equipment.

Firmware-controlled monitoring in the TP-1000 provides constant feedback to the network control center, the spokeswoman continued. This feedback reportedly acts as an early warning system for detecting potential malfunctions before they affect network service.

In addition, speed, code and parity can be either preset on a port-by-port basis under network software control or automatically set at the time a connection is established, she said.

Flow control logic is said to permit remote terminals and computer ports operating at dissimilar speeds to communicate without data loss.

Access to the Telenet network is provided over a full-duplex, 1,200- to 1,800 bit/sec network access channel. Alternatively, TP-1000s can be directly connected to one another via point-of-point private lines, sbe noted.

By using an error detection and correction algorithm, the TP-1000 assures virtually error-free transmission over the access channel to the network without throughput degradation on the low-speed

(Continued on Page 42)

Affect User's Business

Nets Must Be More Reliable: IBMer

By Esther Surden
Of the CW Staff

NEW HAVEN — In the communications system of the future, the user may not know if the data is being transmitted over lines or via a satellite, according to Ed Sussenguth, director of architecture and planning for IBM's System Communications Division.

Speaking on the topic of "where data communications is going" at a recent conference, here Sussengath said communications must become more reliable because it is beginning to affect the substance of a user's business — "the way the entrepreneur runs his business."

A teleprocessing system is complex because it is geographically dispersed by nature and synchronization between parts is very difficult, he explained. It is almost assumed that some part of the system will be down at any given time.

Networks are complex because "most users of systems don't just want to run in batch or interactive [modes] so you have to have programs that can work in all variety" of environments, he stressed.

Older systems also have to coexist with new systems, and there is a problem of complexity with the programs that run on the older systems. Communications handling is interwoven into the applications programming so, if the programmer wants to change a terminal type, for example, it is very difficult to do, he said.

"The key is to break the bond and keep the complexity down in the network handling part of the program," he said.

Other Problems

Problems other than just splitting the communications out of the program can be anticipated, Sussenguth continued. "Today the systems we know "think" about a byte as a unit that really means something."

"Soon we'll have equipment available that will transmit strings of data," he forecast. This kind of transmission will be many orders of magnitude different from byte transmission and will help industries like insurance in which the agent needs to look at a picture of the damage.

Noncoded data will be intermixed with the kind of data we use today, he added.

Another communications development involves the evolution of dumb devices into terminals with computers in them. Microcode will soon exist in what we used to, but no longer, think of as terminals, he said.

"That makes an enormous system difference" because now the user is performing system to system communications rather than communications from a DPU to a dumb electromechanical device.

Very tight control is needed between a host and an electromechanical device, but communications between computers can be program to program.

(Continued on Page 41)

Monitor System Works With IBM CPUs

GERMANTOWN, Md. — The Aspen Systems Corp. terminal monitor system is said to be a general-purpose communications monitoring system that implements and supports the operation of interactive applications between a variety of terminals and IBM 360 or 370 mainframes.

Aspens' system consists of two software modules designed to reside in the operating systems of IBM 360/40, 370/135 or larger IBM CPUs, according to a spokesman.

The terminal monitor provides a common application program interface between the operating system (OS/VS) and user-written programs, along with what is said to be an extensive on-line data management capability.

In combination, the terminal monitor services unit and the monitor command language can maintain line-image and structure data transactions and support source program library management, interactive processor management and process control device and application management, the spokesman said.

Software System

The software system operates in a dedicated or multiprogramming environment with services accessed by a 360 or 370 Supervisor Call routine. User-written programs can be in ANS Cobol, PL/1, Fortran or Assembler, he said.

Security for the system is reportedly provided by project identifier codes and passwords.

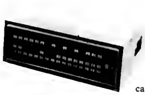
Features of the monitor, the spokesman noted, include terminal-to-terminal message switching, controls over editing and printout and a provision for remote job entry (RJE).

The RJE provision can be used to allow remote terminuls to process data in a conventional RJE mode to activate a job stream which is processed in the mainframe operating system as though it were submitted in a standard RJE mode, he explained.

It adds "little uddiitional overhead" to the CPU and can be activated at the user's choosing at no cost, he noted.

The data management component of the terminal monitor enables compression of 58% of

(Continued on Page 40)



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Most Dominant Trend

On-Site Communications Seen Coming Soon

By Ann Dooley
Of the CW Staff

NEW YORK — On-site communications systems will be the most dominant trend in the communications industry and this will occur within the next few years, according to J. Roger Moody, AT&T marketing director.

Until now there have been many on-site systems, each performing one specialized function such as security, communications or heating applications, Moody said.

A huge number and duplication of controllers, wires and terminals have amassed, but this method of operation is unlikely to continue for long, he noted.

"One controller must be used to handle all of this," he said. The same thing happened in the computer industry when one machime began to perform many functions. "Computer technology doesn't limit you," he noted.

A future advancement will be a communication processing language designed for the user so he can solve problems himself instead of waiting for the vendor to come up with a solution, Moody said.

All of these changes will be coming very soon, he predicted.

At one time, new communication products and services would take a long time from the concept stage to delivery. At Bell Systems, it would take 7-1/2 years, but "those days are ended," he added.

On-site communications systems will spread to home use, Moody forecast. Energy is quickly becoming one of the key issues and a system with a simple algorithm could determine peak usage times and regulate all home electrical devices, he said.

All systems whose messages must be sent to several points quickly and efficently could be linked to the same on-site system, he said.

On-site systems could also help increase office productivity, he added.

In Bell's first 100 years, Moody said, all the phone lines were tied together.

In the second 100 years, Bell's job will be to tie every different type of device together for completion of the message, he predicted.

J. Roger Moody

Monitor Supports Unit Interaction

(Continued from Page 39)

original data without space reorganization. Disk space is immediately available for reuse if not explicitly saved, Aspen claimed.

The software system can handle any terminals compatible with Teletype Corp. devices, or IBM 3270, 2260, 2780, 3780 and 2741 terminals, the spokesman stated.

Transparent Communications

Transmission speed of any of those terminals is transparent to the monitoring system, he added.

The Aspen terminal monitor system is available on a permanent (25-year) license for $23,500. It can also be leased for one year for $885/mo, three years at $690/mo or rented on a month-to-month basis for $1,000, he said.

Aspen is located at 20010 Century Blvd., Germantown, Md. 20767.

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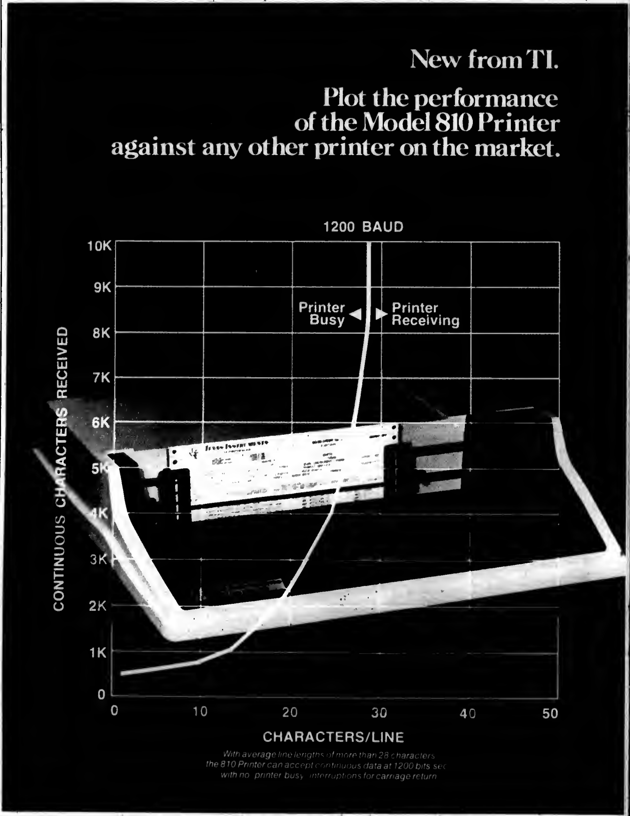

With average line lengths of more than 28 characters the 810 Printer can accept continuous data at 1200 bits sec with no printer busy interruptions for carriage return

T-Bar Expands Net Control Line With Diagnostic Devices

WILTON, Conn. — T-Bar, Inc. has expanded its network control product line with the TD-9, an intelligent diagnostic device for communications users.

The TD-9 comes with a CRT display and data trap. It acts as an interactive monitor, loop tester; as well as processor and terminal emulator, according to the firm.

In addition to the 16-line, 512-char. display capabilities of the monitor's CRT, the TD-9 comes with two user-specified programs to enable variations in the line discipline, code and format, a spokesman noted.

These programs are entered into the fixed memory of the terminal through the standard 128-char. keyboard, he said.

An integral data buffer permits the device to store up to 3,500 char., he added.

The instrument operates in asynchronous, isochronous or bisynchronous formats. It features programmable data rates from 50- to 9,600 bit/sec, in addition to both half- and full duplex capabilities.

Options for IBM Synchronous Data Link Control (SDLC) line disciplines are available. The SDLC capability will be expanded to include the CCITT's Higher-Level Data Link Control (HDLC), X3 and X.25 protocol standards, as well as the International Passenger Airlines Reservation System (Ipars) discipline, the spokesman added.

Mode Operations

Used in its lopp text mode, the diagnostics terminal generates "fox" messages and random character messages for system- and self-tests, T-Bar said.

The processor emulator mode generates polls, provides timing of critical functions and performs error checking, whereas the terminal emulator mode allows the TD-9 to respond to polls and perform timing and error checking, the spokesman explained.

In the intelligent monitor mode, the device traps user-specified character sequences. The data trap can be used for selective storing or highlighting, the company noted.

Twelve LEDs indicate interface circuit activity, the spokesman stated, adding 25 pin jacks provide access to devices with an RS-232 interface.

The 24-lb diagnostic tool can also be configured as part of T-Bar's network control center equipment, the spokesman noted.

A carrying case is available to facilitate the TD-9's portability, he added.

The TD-9 costs $9,000 and includes the two line-format options. The carrying case costs an additional $175 and the SDLC option "will cost under $200," the spokesman noted.

T-Bar is located at 141 Danbury Road, Wilton, Conn. 06897.

Net Must Be More Reliable

(Continued from Page 39)

In addition, applications programming can now be done in the remote areas, giving more responsibility to the user. The types of data that can go back and forth between host and terminal are different so the users responsibility is enhanced, Sussenguth said.

But, with only certain types of data transmitted, system availability becomes key..

"Local processing is the only way to combat the system availability problem that exists when the telephone lines go down," he said.

In almost every major country, users can send data over networks devoted to local processing. The speeds accommodated by the networks are increasing, he said, so 4,800 bit/sec, 9,600 bit/sec and 56 kbit/sec speeds will be common soon.

In addition, more value added carriers will be available in the future. These services will provide code conversion, delayed delivery or closed customer groups, for example, he noted.

Satellite transmission will soon be a reality and it will provide certain benefits.

With a satellite, "you can broadcast information to all your subsidiaries at once." Satellites also provide the possibility of switchable band widths, he said.

Tariffs are becoming distance-insensitive, he noted. Because of this, the user will have to choose among all the options available and find the best combination.

Software complexity remains the biggest problem, but an international standard is being developed, Sussenguth said.

"But don't expect the standard to be your savior," he warned. "Such things are usually fuzzily written."

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IBM Users Get Gamma Display System

PALO ALTO, Calif. — The GT-70 telecommunications display system from Gamma Technology was designed for IBM system users who want 3270 emulation and the opportunity for upgrading to distributed processing.

Up to 32 IBM 3271- and 3275-compatible CRT terminals can be attached to the company's GT-70 system, a spokesman stated.

The communications system software utilizes IBM's binary synchronous communications (BSC) line discipline for transmission at speeds up to 9,600 bit/sec, Gamma noted.

Data General Corp. minicomputers comprise the system hardware. A typical configuration includes a DG Nova or Eclipse CPU serving terminals with any mix of display speeds from 300- to 9,600 bit/sec and printers operating from 30 char./sec to 600 line/min, the company said.

The GT-70 program can be configured to run under standalone, mapped or unmapped disk-based systems. In the mapped configuration, a second user partition is available to permit simultaneous foreground and background operation, according to Gamma.

When not used in 3271 applications, the GT-70 is said to be a general-purpose system capable of supporting multiterminal editing, multiterminal Basic or other user-written applications.

The system price ranges from $32,000 to $93,000 depending on the number of CRTs, CPU size and I/O devices desired, Gamma said from 800 Welch Road, Palo Alto, Calif. 94304.

Telenet Unveils Micros For Network User Sites

(Continued from Page 39)

asynchronous ports, she stated.

The TP-2000 series was designed as a host interface processor for users with a requirement to simultaneously support 12 to 32 asynchronous terminals.

Telenet said it is plug-compatible with Bell 103, 113 or 202 series or equivalent modems and is designed to require no software changes in the host computer or communications control unit.

Telenet also designed the TP-2000 to operate for extended periods in an unmanned environment.

A high degree of availability and reliability is obtained from its component modularity, dual-bus architecture, parity protection on all memory and busses, independent line processing units with dedicated microprocessors and memory and centralized monitoring and diagnostic firmware, the spokeswoman claimed.

Dual access lines to the network are also supported, she added.

The TP-2000 can be configured as the TP-2000R, a redundant unit with dual memory, line processing units and power supplies, she said.

The flow control feature enables asynchronous ports at the host end to operate at 1,200 bit/sec while terminals at the remote end operate at any speed from 75- to 1,200 bit/sec to attain rapid network response time and eliminate multiple rotaries, she added.

X.25 Network Access

Access to the Telenet central office is provided over a 2,400- to 9,600 bit/sec full-duplex circuit, using the CCITT X.25 packet-switching protocol to promote error-free transmission of all data, according to the firm.

The TP-2000 allocates circuit bandwidth based upon actual traffic, which reportedly permits the processor to support more terminals without an increase in circuit capacity.

Typically, the device can support 2 to 2.5 times the number of terminals on a circuit than can a conventional multiplexer, Telenet claimed.

Like its TP-1000 counterpart, firmware controlled monitoring in the TP-2000 provides constant feedback to the network control center.

The TP-2000R will be available for users in the fourth quarter of this year, the company added.

A TP-1000 with three ports costs $6,000 to purchase, $200/mo to rent and $200 to install. The processor's access port for the Telenet central office costs $150/mo and an additional $350 to install, the spokeswoman said.

A TP-2000 with 12 ports costs $23,000 to purchase, $770/mo to rent and $600 to install. Its central office access port costs $300/mo and $400 to install, she stated.

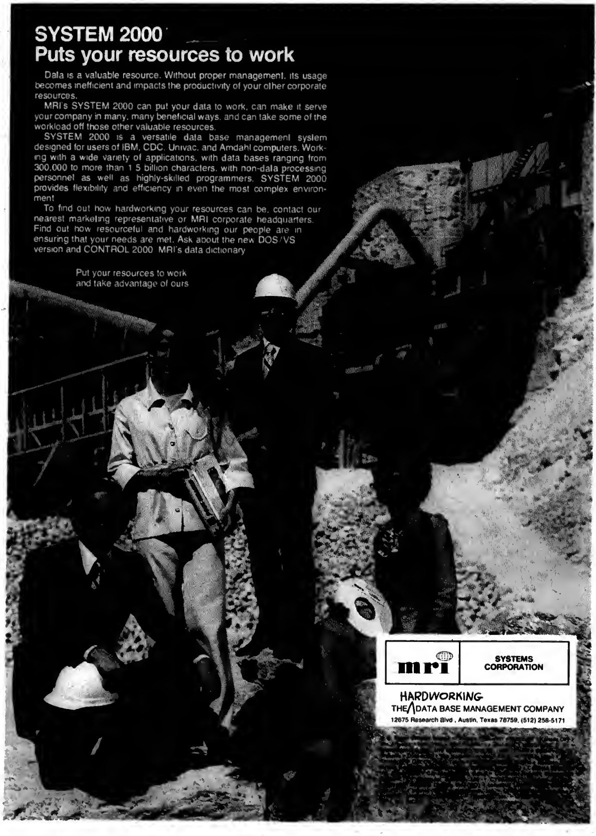
Four additional TP-2000 asynchronous ports are scheduled to costs $2,400 or $80/mo, while its installation will cost an additional $100, if not done at the time when the basic unit is installed.

The TP-2000R with 16 active and 8 standby ports costs $51,000 to purchase or $1,700/mo to rent; installation costs $1,000.

Eight additional ports costs $4,800 or $160/mo and the processor's access port can be rented for $300/mo and installed for $400.

Rotary feature options for all three processors cost $50 to install and $20/mo. Other options for all three include a private network feature. Answer-only modems are available for the TP-1000.

Telenet is located at 1050 17th St., N.W. Washington, D.C. 20036.



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Bits & Pieces

ISI Introduces Fiche Option For Data Storage, Retrieval

CULVER CITY, Calif. — Image Systems, Inc. (ISI) has unveiled its ISI 5000 computer-controlled automated fiche retrieval and display system.

A "receive-only" peripheral, the ISI 5000 can be used with any interactive terminal to combine microfiche storage and computer retrieval of large amounts of alphanumeric and/or graphic data, the firm said.

The unit contains up to 180,000 fiche pages of information, any one of which may be computer selected and displayed in 3 sec on an 11-in. by 14-in. screen, according to a spokesman.

A fully loaded system can make over 1G char. available for on-line display to an operator, the equivalent of 30 40M-byte disk drives, the spokesman claimed.

The interface was designed for bit serial information. The interface can be equipped for either RS-232C or current loop I/O signals. Transmission rates from 75- through 9,600 are field selectable, he added.

The unit costs $8,800 from the firm at 11244 Playa Court, Culver City, Calif. 90230.

HI Offers Plotter Controller For Use With CDC Cyber

AUSTIN, Texas — Houston Instruments (HI) has introduced the Complot BTC-7/734 plotter controller for use with the Control Data Corp. Cyber 18-5 remote batch terminal.

The controller was originally designed to interface between the CDC 734 and Complot digital plotters and is now applicable to the Cyber 18-5 for graphic plotting, according to the firm.

The system adapts to standard Cyber 18-5 controller and Controlware equipment, does automatic plotting at speeds up to 4.5 in./sec and can be installed in less than an hour with no modifications, the firm said.

The plotter controller costs $2,595 from HI at One Houston Square, Austin, Texas 78753.

Line Voltage Protection System Reduces Line Noise

BINGHAMTON, N.Y. — A solid-state line voltage isolation and protection system that reportedly reduces line noise and offers protection against transients is available from Control Concepts Corp.

Islatrol units feature input ranges from 105 through 408 volts RMS, with from 50-Hz to 400-Hz frequency. Standard units operate at 1-, 2.5-, 7.5-, 15- and 30A.

Prices start at $24.25 from the firm at 333 Front St., Binghamton, N.Y. 13905.

A 'Tug-of-War' Decision

COM: In-House or Out? Factors Outlined

DALLAS — Users trying to decide whether to establish an in-house computer-output microfilm (COM) system or to retain a service organization must consider at least eight factors, according to James W. Lewis.

Lewis, vice-president of branch operations for U.S. Datacorp, a COM service company based in Portland, Ore., told attendees of the annual convention of the National Micrographics Association here that volume and cost have been the traditional criteria in making the decision.

However, he added, COM users also need to analyze their organization's geographic location vis-a-vis available vendors, management philosophy, turnaround needs, technical knowledge of COM, vendor capabilities and data security needs.

"The in-house or service decision is often a tug-of-war," Lewis said, noting that neither alternative is always right for every organization. He urged COM users to evaluate their particular situation, based on these criteria, and to choose accordingly.

Magical Figure Myth

The existence of a magical volume figure at which in-house systems become more economical than service bureaus was dispelled as a myth by Lewis. Volume is a factor at the two extremes of the spectrum, he pointed out.

"An organization needing fewer than 100,000 frames of COM a month could probably not afford to go in-house. On the other hand," he said, "it would be very unlikely that an organization requiring more than a million frames a month would still be on service."

Most COM users fall between these two extremes and this is where other considerations become more important, Lewis indicated.

Companies tend to go in-house with lower volumes if they are located in outlying areas where high equipment costs are offset by higher costs for distribution and delivery. In bigger cities, where multiple service and hardware vendors are located, companies do not usually go in-house until they reach higher volumes, he said.

Many companies take a "we'll do it ourselves" approach to services like COM, in which case an in-house capability might be more desirable.

However, many companies see COM as an incidental aspect of their total operation and are quite satisfied to let someone else handle the problems attendant with running a COM production facility, he said.

A major measure of user satisfaction with COM lies in the time that elapses from when a tape is available for processing until it is in the user's hands. Users need to determine what turnaround time is required, and to test whether a service bureau can deliver on time.

They shouldn't assume that an in-house system is necessarily quicker, Lewis cautioned. Internal departments can miss deadlines with COM just as they can miss daily turnaround on paper reports.

The volume and the size of the application can be crucial to on-time delivery, Lewis noted. A large number of small jobs with tight turnaround may be best handled by an in-house system. However, if time is not crucial or if jobs are only run on a weekly or monthly basis, service might be more practical, he said.

Knowledge of COM

Probably the most important consideration is the organization's knowledge of COM, Lewis continued.

"Have you determined the best applications, reduction ratios, indexing capabilities and storage retrieval devices for your organization's individual needs?" he asked his audience. "Even more important, have you found out whether COM will be accepted in your company?

"A good way to learn," he suggested, "is to start with COM on a service basis."

Highly competitive industries where security of data is important may desire to go in-house — even if their volume is low and the per-fiche cost is high. Even if security is not critical, COM users should investigate a prospective service bureau's screening and bonding procedures, plus their I/O controls to eliminate any security problems, he advised.

In evaluating a prospective COM service bureau, user should check the reputation of the firm, the performance on deliveries, quality of work and the firm's financial strength.

Other factors included are the company's involvement in research and development and user education, indexing capabilities and the ability to come up with products and services that will allow the users to take advantage of the most recent opportunities in the COM field, he said.

Know the Hidden Costs

Finally, Lewis warned prospective COM users to become familiar with the hidden, as well as obvious, costs of in-house systems. One-time charges that occur in either a service or in-house situation may include software, systems changes and forms slides.

Some service bureaus charge a fixed price for each original frame or a fixed price for each fiche; others charge for each copy frame or each copy fiche, he indicated.

In-house COM costs are often more difficult to determine, according to Lewis. Prospective COM users too often rely on vendors to come up with in-house COM cost estimates.

While hardware suppliers can provide figures on maintenance, lease and rental costs, they tend to minimize the costs for "people, reruns and redundancy," he said.

Personnel, consumables, space and management can represent up to 60% or 75% of an organization's total in-house costs, Lewis estimated. Yet, he noted, these are the very areas that organizations often refuse to acknowledge when planning their installations.

(Continued on Page 48)

Five COM-Related Products Bow

DALLAS — Datagraphix, Inc. introduced five products related to the computer output microfilm (COM) market at the National Micrographics Association exhibition here recently.

The firm unveiled a dual 1,600/6,250 bit/in. tape drive, a 48M-bit four-surface disk drive for the firm's 4550 and 4560 COM recorders, a full-reversal module and a diazo duplicator for its Autocom recorder/processor and a microfiche reader.

The 1,600/6,250 bit/in. read/write tape drive offers automatic tape loading and reportedly increases throughput and reduces operating steps. Error detection and correction capabilities are included on the 6,250 bit/in. drive, the firm said.

The unit's formatter/controller can manage up to four drives. The drive is available as a factory order for $39,000 or as a field upgrade.

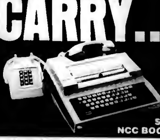
The 48M-bit four-surface disk drive was designed for random access requirements, the firm said. It utilizes one fixed and one IBM 5440-type removable cartridge and costs $20,000.

The full-reversal module for the Autocom recorder/processor automatically reverses film polarity and produces cut, dry, negative-appearing microfiche in the format required for diazo duplication, the firm said. The module costs $2,900.

The Model 72 duplicator was designed for use with the full-reversal Autocom to produce Diazo microfiche in medium-volume COM operations, the firm explained. The unit produces up to 400 cut diazo microfiche per hour and costs $11,800.

The Datamate 100 reader displays full-size images of source document or COM microfiche on an 11-in. by 14-in. screen. It provides 24-, 42- or 48-power magnification and costs $229.

Datagraphix can be reached at P.O. Box 82449, San Diego, Calif. 92138.



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Exploring DDP – Part 3

CPU Compatibility Stressed for Successful DDP Net

By Richard Weber
Special to Computerworld

Hardware for the distributed data processing (DDP) network should be supplied by a single vendor and must be available in a range of sizes. This will allow a processor to be configured to exact department requirements and permit the small department as well as the large one to justify a node.

In the absence of small configurations, that department must time-share with a, larger department. Similarly, a good upward growth path will assure that anticipated larger applications can be covered.

It is essential that all processors can use the same peripheral devices — that they can be interchanged and thus be accessible to each node in the ring. All processors in the ring must be compatible so they can run one another's programs and back each other up.

Applications are assigned priorities so a small processor does not back up a larger one, although it could take over a subset of critical activities.

The processors in the ring are tied with one of four types of communications links: parallel links, serial links, standard communications links or shared-memory mechanisms. All activities between processors occur over the links.

Like the hardware, operating system software must be configurable to smaller subsets so every application can justify itself as an official node. It must also be compatible so critical application programs can be taken over by another processor in the ring.

In a DDP network, it is essential that a full range of operating system and complementary software is available. It is important to have multiprogramming capability to allow multiple users to access the system without contention.

This is particularly important for a program development processor because it will let a number of application programmers run, test and debug their code concurrently. There should be a full set of program and development tools, including debuggers, text editors, diagnostics and loaders.

Finally, there should be a complete set of languages, such as Cobol and RPG for batch-oriented business applications, Fortran for scientific applications and Basic for time-sharing and engineering applications.

In a loosely coupled configuration, node functions are assigned in the same way as in the ring, but hardware and software requirements are more flexible.

Software support needed for communications among the processors in the ring will vary with the distance between the nodes. If the nodes are side by side, one can be designated to handle all communication functions and thus carry the bulk of communications software overhead.

This is the final article in a three-part series on centralized vs. decentralized processing by Richard Weber, vice-president of sales for Data General Corp. This series is extracted from a presentation given at the 21st University of Alabama DP Conference held in Birmingham, Ala., earlier this year.

This week Weber examines the hardware, software and communications requirements for a distributed data processing network and shows how two firms approached the subject of meeting diversified processing needs.

A communications access software package routes data around the ring as specified by other processors' application program. The application program only indicates the designation.

In rings that are geographically spread out, each node will have to have its own communication subsystem, hardware and software. In both forms, communications software should reside in operating system space, not in the user's space.

Structuring Data

There are several methods of distributing files or data bases in DDP networks. One is to have a common data base accessed by all processors in the ring; another is to give each processor a copy of the common data base; still another is to give each processor its own individual data base for its assigned application.

The most effective way to structure data in a ring network is the latter, which distributes the data base as well as the processors and therefore comes closer to true distributed processing because each application has data base resources dedicated to it and the data flow matches the processing flow.

I think what quickly becomes evident in these various hardware and software design considerations is that the user becomes somewhat more self-sufficient than he has been in the past. He relies less on his vendor.

Satellite Processing

One other kind of DDP is called satellite distributed processing. This is an independent, self-sufficient processor apart from the host. The satellite system may be an end in itself, or it can be the first critical step to total decentralization.

From the DP manager's point of view, a satellite familiarizes the organization with the concept, techniques, problems and implementation of DDP before the entire DP load is converted. It is a low-risk, highly educational and foresightful approach.

An experimental test of the benefits and suitability of satellite (and eventually totally decentralized) processing starts with a single, dedicated application that is well defined and bounded. The application should be one that is problematic on the host mainframe because of cost, throughput, response time, overhead, real-time or interactive requirements.

Removing this application from the host often means preventing an imminent upgrade. Alternatively, the application can be a new one that would pose the same upgrade and conversion problem.

Herein lies the cost justification as well as the advantages of dedicating a processor to an application. These advantages include better response time, up-to-date and immediately accessible data, easy resource and cost allocation and higher system reliability

(Continued on Page 47)

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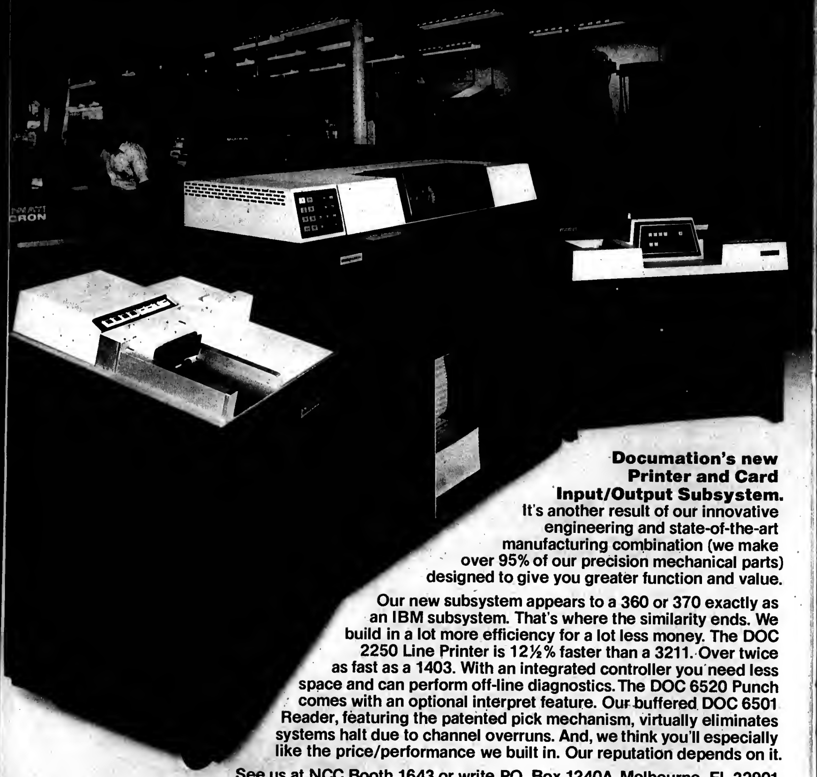

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CPU Compatibility One Factor Essential for DDP Net Success

(Continued from Page 44)

and availability.

An example of using DDP is shown in the way two different companies have set up networks in two different ways.

The first is a large North American heavy equipment dealership. The company carries a $15 million parts inventory of about 250,000 line items. It has 25 geographically remote parts operations, each of which maintains its own inventory (parts stock may vary from one to the other). The company's previous DP equipment was a large batch system.

The company installed two Data General Eclipse C/300 small systems at its headquarters. These act as the central system for a real-time interactive network of intelligent terminal systems located in the remote operations.

The intelligent terminal systems consist of a DG Nova 3 minicomputer with two or more CRT displays and one or more line printers. Each terminal system is connected to the central Eclipse system by dedicated, synchronous lines.

The network gives each remote operation immediate on-line access to inventory data stored on the central system. If a local operation does not have a part in stock, it can query the data base to see which locations do.

This lets the parts person compile a complete purchase order line by line, no matter where the parts are actually located.

The system also handles order processing. Once the purchase order is completed, the central system removes the parts from inventory and cuts an internal shipping order. In addition, the network handles interoffice communications, replacing TWX and Telex.

This network approach to DP is speeding up order processing. It has also improved inventory control, reduced total inventory and lowered communications costs among the various remote operations.

The second example illustrates a different approach. The user is a holding company of electrical and plumbing supplies distributors. There are 14 subsidiaries located in several different states.

Each subsidiary operates autonomously and has its own profit and loss statement. Consolidation is done at year-end.

The holding company and the subsidiaries had limited DP capabilities ranging from manual methods to small IBM System 3s. The holding company itself had a batch 3/10.

The company determined it needed an online order entry and purchasing system for itself and its subsidiaries. The previous vendor first suggested an upgrade and the addition of remote job entry terminals. It later recommended an IBM 370/135.

The user rejected these proposals and elected to look for an alternative. For company headquarters, it chose a DG Nova 3 system with a 10M-byte disk, CRTs and line printer for its own operations.

Each of the subsidiaries has a similar configuration and uses similar software. Once a week, the subsidiaries transmit summary information to headquarters over dial-up lines, off-line, all night.

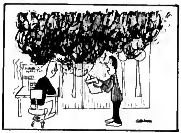
All the systems handle the same basic functions — accounts receivable and payable, general ledger, local payrolls and local inventory management. Inventory information is stored in the local data base; users have on-line, interactive, multikeyed access to the data.

This DDP scheme provides each operation with total DP support. It allows each to manage its inventory more effectively and permits immediate on-line access to the inventory data.

In addition, headquarters regularly receives the summary information it needs for overall corporate management.

Two firms, two different solutions. Only 10 years ago computers were too expensive to consider decentralizing control of them.

Today, however, their prices, including software, are approaching the level where it is foolish to suboptimize computing costs at the expense of the costs of the people who really do the work.



'Try Hitting "Interrupt" and "Load" Again...'

COM Option Improves Image

NEWPORT BEACH, Calif. — Bell & Howell has announced a high-resolution option for its 3700 computer-output microfilm (COM) recorder and 3800 COM system that reportedly improves stroke-generated COM image quality.

The firm also introduced a software library including more than 20 tapes, each dealing with different magnetic tape formats.

The character option features stroked characters in a 14 by 24 stroke matrix. Characters can be formed in upper or lower case, standard, italic or bold font in any of three sizes.

It utilizes OCR-B font with complete Ascii and Ebcdic character sets.

Stroked characters are similar in concept to dot matrix characters because the characters are formed through the use of a series of short strokes, according to a spokesman. The advantage over dot matrix characters is the variety of different fonts that can be formed, he explained.

The tape input program modules now available include eight IBM formats, four Burroughs formats, three Honeywell formats, two Univac formats and modules for the Digital Equipment Corp. DEC-10, Datagraphix, Inc. 4440, Kodac KOM 90, NCR Century and Seaco formats Specialized formats are also available.

These modules, each designed for a different magnetic tape format, permit the 3800 system to directly process print tapes from any specified processor to produce 16mm microfilm or 105 mm microfiche.

The anticipated price for the option is $3,850, the spokesman said from 1451 Quail St., Newport Beach, Calif. 92660.

Should your access control system be DIGITAL OR CARD?

The answer to that is the system you can work with most easily. And at Sargent & Greenleaf, we think when you compare the two, you'll find digital systems are more flexible. Here's why.

With a digital system you can change your combination whenever you want—every shift or every day for example—and you can change it yourself. Then, simply notify people of the new combination.

With a card system, you generally must rely on someone else to make new cards for you. If an employee loses or misplaces his card or it's stolen, there's a troublesome delay in getting a new card or in some cases *all* new cards issued.

And as your organization grows, it's easier to issue new people the combination than work around the delay of having cards made.

With a digital system, there's never a problem about what to do with old or lost cards. And while it can be said that it's easier to transmit a combination than a card with your name on it, even most sophisticated cards can be duplicated in a matter of minutes.

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See us in Booth 2022

Labor Reporting Ranks as Favorite FDC Application

By Frank Vaughan
Of the CW Staff

WETHERSFIELD, Conn. — In a survey of manufacturing companies located in the Northeastern region of the U.S., some 24% of the respondents reported they are current users of factory data collection (FDC) equipment.

Of these users, 95% reported having in excess of 300 employees and annual sales of over $20 million.

The survey was conducted in January by Rolfe Associates, Inc., a manufacturing systems consulting organization here.

The most popular application for FDC is labor reporting, with 80% of the FDC users reporting it in operation. The next most popular uses are time and attendance and inventory tracking, each with a 70% use rate. Sixty percent of the FDC users are utilizing it for work order tracking and 30% reported "other" uses, according to the survey.

For redundant/backup capability, no particular medium has an overwhelming acceptance, with magnetic tape (33%), disk (27%) and controller (18%) showing the most popularity. Diskette (6%) and source documents/paper tape (16%) round out the capabilities in use, the survey showed.

Some 70% of the FDC systems are operating in a batch environment, with the remaining 30% on-line. Approximately half of the responses indicated that the labor reporting terminals are used for the time and attendance function. Of the remainder, 30% have no time and attendance application and 20% use a badge reader only for time and attendance.

The spectrum of capabilities of the labor reporting terminals in use is quite wide. Variable input is usable in 90% of the applications with numeric inputs proving more popular than alphabetic. Ten- and 22-column badges, as well as 80-column cards and eight- to 12-key function buttons, are usable in 80% of the applications. Character displays of five to 16 characters are in 50% of the terminals and short cards in 10%.

The users indicated a clear majority have plans to either expand or replace their systems, with 10% indicating plans to do both.

Of the firms not currently using FDC, 81% indicated that a review of the potential for FDC equipment or applications is planned. An intent to install FDC equipment or applications was noted by 63% of the nonusers.

When asked which FDC vendors would be considered, the majority of the responses referenced multiple vendors under consideration. "However, 32% of the responses indicated the selection process was open to all vendors or that the vendors to be considered had not been selected. This showed an increasing awareness on the part of the user community that the number of vendors is expanding and new products are entering the marketplace," the report concluded.

Rolfe Associates is at 185 Silas Deane Highway, Wethersfield, Conn. 06109.

COM Site Based On Eight Factors

(Continued from Page 43)

Lewis encouraged prospective COM users to visit four or five current in-house installations and to tour first-hand any service bureau they may retain.

Prospective in-house users should visit organizations that are similar in size and nature to their company. They should look at how the in-house lab is run and ask questions about the owner's experience and equipment configuration, he suggested.

The service bureaus visited should be clean, neat, organized and have control procedures and documentation. Also, prospective users should check the experiences of present users by obtaining a list of customers and talking with some of them about the quality and consistency of the bureau's work, he advised.

In-house systems offer control, security and equipment configuration tailored to a user's specific needs. Service bureaus offer flexibility of commitment and improved efficiency since users pay only for services received and do not have excess capability sitting around the office, he said.

If properly chosen, bureaus also offer a proven ability to perform, which users may not have in their own in-house installation, he added.

Monarch Adds Two Scanners

DAYTON, Ohio — The models 2243 and 2246 scanners from Monarch Marking Systems read bar-coded data from tags, labels, credit cards and other sources, the firm said.

Each unit consists of an RS-232 serial interface or a parallel interface and a hand-held "light pen," according to Monarch.

A 2243 or 2246 user can scan at speeds ranging from 3- to 30 in./sec forward or backward and over curved surfaces. The scanner logic includes error checks for character validation, bit count, message format and character count.

The Model 2243 costs $825 and the Model 2246 is priced at $870.

Monarch can be reached at P.O. Box 608, Dayton, Ohio 45401.

The complete $655 line printer.

It's ready to plug in, has an 80-column format, a remarkable MTBF and is 14 times faster than a teletype!

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When we say complete we mean it
The EX-800 is a stand-alone unit with case, power supply, 96 character ASCII generator and interface, paper roll holder, infra-red low paper detector, bell, and multi-line asynchronous input buffer. You won't find these standard features on any other printer, regardless of price!

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Our printer is so complete, that we offer only one option. A serial interface (RS 232C or current loop) good for 16 baud rates from 50 to 19,200 and thoughtfully provided with a switch for either Centronics or Tally compatibility. Might we call it a Tallywhacker? At $85.00 it certainly should be!

Built-in LSI microprocessor
The heart of the EX-800 is a printed circuit card, containing a custom LSI chip made by Intel to Axiom specifications, which controls all printer functions. Microprocessor power means flexibility. Such as the built-in self test routine and variable character size. It also means reliability. Several industry surveys have shown LSI to be many times more reliable than equivalent conventional circuitry.

THIS LIFE-SIZE SAMPLE SHOWS THE 80-COLUMN PRINTOUT FROM AXIOM'S EX-800 PRINTER

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Our EX-800 weighs in at 12 pounds, is just 9½ inches wide, 4 inches high, and 11 inches deep, and is delightfully quiet which makes it ideal for office and other low noise environments. The simple print mechanism is virtually maintenance free. In fact, tests show an incredible MTBF, many times greater than impact printers. This versatile printer is the ideal mate for micros, minis, CRTs, instruments and systems.

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See Axiom at NCC. Booth 104 Personal Computing Section

Handles Large Data Bases

GA 440 DS Features Interactive Cobol Capability

By Toni Wiseman
Of the CW Staff

ANAHEIM, Calif. — General Automation, Inc.'s 440 Data Series (DS) combines the 128K GA-16/440 minicomputer with an interactive multiterminal Cobol capability.

The system also offers large data base handling technology—up to 160M bytes, according to the firm.

The Ansi Cobol offered with the system is one verb short of Level 2, and is said to compile at up to 10 times the speed of a typical IBM 370/145. Minimal conversion efforts are required to run existing Cobol programs from any large IBM mainframe, a spokesman claimed.

Cobol compilations can be made from any number of the 16 terminals in the system while other operations proceed simultaneously, he said.

The 440 DS is the initial product in a potential DS family, the spokesman claimed. Future additions may be based on the firm's 110 and 220 minis, with each system offering different functions based on the capabilities of the CPU, he noted.

The 440 DS is hardware-compatible with all other GA equipment and can use the full line of peripherals available for the Solution Series, he added.

Performance Guarantee

Fortran and Basic will run on the 440 DS, but the operating system has been optimized for Cobol. As a result, GA will not guarantee performance with any language but Cobol, the spokesman indicated.

The spokesman said the 440's operating system had been modified somewhat to accommodate Cobol, but the changes were primarily in the file structure and the interfaces between modules.

The multiterminal system is designed for the sophisticated OEM and Fortune 500 type user; therefore, GA will not be providing any application software for the system, which is said to compete with Data General Corp.'s Eclipse C/300 and Digital Equipment Corp.'s Datasystem 500, according to the spokesman.

The software configuration includes the Control III real-time operating system, the IOS input/output system, a Cobol compiler and runtime library, MTS multiterminal time-sharing system and FMS Isam file management system.

Hardware for a basic packaged system includes the GA-16/440 CPU with 128K bytes of core, a 10M byte disk, 200 line/min printer, 400 card/min reader and two video display terminals.

Communications protocols include 2780 and 3780 emulation, remote job entry, Hasp and others available on the 440 mini.

The 440 DS is available in a credenza package for office environments or in rack-mounted versions for use in computer room environments.

A basic system costs less than $40,800. Identical hardware-only systems for end-user distributed processing systems or OEM products are priced from $32,400. There is no price differential between the credenza and rack-mounted systems, the spokesman added.

Customized systems options include up to two 10M- and/or 80M-byte disk drives, up to 16 CRTs, 600 line/min printer and 25 in./sec tape drives, GA said from 1055 South East Street, Anaheim, Calif. 92803.

GA 440 DS system

DEC Adds Single-Chip PDP-8 Family Unit

By Esther Surden
Of the CW Staff

MAYNARD, Mass. — Digital Equipment Corp. has introduced another member of its PDP-8 family in addition to a word-processing configuration built around it.

DEC Decstation VT78

Designated the Decstation VT78, the system uses a single-chip version of the PDP-8 CPU which is integrated into a CRT terminal. Floppy disks are used as the mass storage medium, the firm said.

The CPU includes an LSI version of the PDP-8 with a 16K-word random-access memory. The display is a Decscope-type video terminal with both alphabetic and numeric keypads, upper and lower case Ascii character set, special symbols and user-defined special function keys, the company added.

The system includes both Fortran IV and Basic compilers for high-level program development and operates under the OS/78 executive, also introduced, which resides on floppy disks.

Disk-Resident Monitor

The OS/78 disk-resident monitor is an extension of DEC's OS/8 executive for tape or disk storage PDP-8 systems, the firm said. It is a single-user executive that permits program development, data storage and numerical analysis to he performed on the stand-alone unit.

Special programs, including special-purpose "bootstrap loaders," can be read into the VT78 via a program injection module that attaches to the terminal. With the RTS/8 real-time monitor, the Decstation can perform multitasking functions, the company noted.

Plug-Attached Peripherals

Designed for large-volume end users and OEMs, the system can operate either in a stand-alone mode or as an element in a network. Peripherals can be plug-attached through ports on the system and are the same peripherals used for other DEC systems.

Peripherals are attached through ports on the VT78 via individual cables, the firm said. Five ports are available: two synchronous serial interfaces for communications or terminals which accommodate speeds from 50 bit/sec to 1.92 kbit/sec; one parallel unit for printers and custom interfacing that is said to provide bidirectional transfers at rates to 15K word/sec; one for floppy disks; and one to facilitate local input of programs.

The system reportedly can run standard PDP-8 programs, allowing users access to the DEC program library or applications developed through the Digital Equipment Computer Users Society.

The WT78 is a word-processing system built around the VT78 with the ability to manage text entry and editing in configurations ranging from stand-alone word processing stations to large, multiuser shared logic networks, DEC said.

Word Station 78

A configuration, dubbed the Word Station 78, includes a single-user system consisting of the WT78, dual floppy disk unit for local mass storage and a letter-quality printer or a 180 char./sec matrix printer.

The unit can operate in conjunction with the firm's PDP-11 with WPS-11M software that can be used in a multiuser information processing network which can handle a mixture of DP and text editing applications.

The software allows as much as 88M bytes of disk to be shared by as many as 48 word processing users, the firm added.

Optional communications software allows Word Station 78 systems to interact with PDP-11s over telephone lines.

The basic Word Station 78 with 16K words of memory, dual floppy disk, CRT and letter-quality printer costs $13,990.

The standard Decstation VT78 with a dual floppy disk drive costs $7,995 with deliveries beginning in September, DEC said from Maynard, Mass. 01754.

Minis Seen Shining in Production Applications

By Esther Surden
Of the CW Staff

NEW HAVEN — Minicomputers can be used to support forecasting, production, purchasing, scheduling, inventory control and production analysis, according to Richard B. Peck, president of EEGO Systems, Inc.

Speaking at a recent conference here, Peck said his firm has been implementing a production control system on a 32K-word Data General Corp. Nova minicomputer that it sells as a turnkey system.

The Nova uses a MICOS operating system from Minicomputer Systems.

The object of production control is to oversee the production process to assure optimum adherence to established standards, he stated.

The production control cycle consists of a demand for a product, allocation of resources, actual production, analysis of the production and planning based on that analysis.

Manufacturers have real orders on hand and an anticipated demand. The combination of the two gives the quantity known as "product demand," Peck explained. "Once I have a product demand, I can run it through the bill of material processor and come up with a resource demand," he said. Resources include facility, labor and equipment.

Many organizations do not consider labor as part of their resources, but it must be allocated just as materials and facilities must be, he noted.

After production, an analysis must be developed from the variance of standards, schedules and previous forecasts in terms of production time, facilities, material and labor, he said.

Future planning can be done purely by the computer, but he stated, this often fails. The Edsel is the best example of computer planning yet, he said.

The best thing is to let the computer give its best estimation and then use judgment based on experience to temper what it recommends.

Dynamic Planning Best

The best kind of planning is dynamic, Peck added. Fixed planning lets the user project in January and evaluate in December what should have been changed in June, he said.

A bill of materials processor can be easily devised to run on minicomputers at less cost than on larger systems, he indicated.

The bill of materials is basically a list of what, when and how much material, facilities and labor is needed to make the various assemblies and subassemblies that go into a particular product. It also indicates the sequence needed to put the product together, he said.

The product master file contains characteristics of a product, such as style number, weight and location.

Beating the System

Exploding files have been the traditional thorn in the side of those attempting to use a bill of materials processor, but Peck said he has devised a method to deal with this—a fast bill of materials processor.

The user would use it for big bulk runs, he said. It explodes to a level specified by the user. Since minicomputers don't perform sorts very well, Peck said he indexes every file.

Peck pointed out that a mistake many users make is that they try to put parameters that belong in the resource file in the bill of materials file. Then they wind up having to change the bill of materials file, he said.

With his method, the file does not need to be updated.

Small System Helps Fast Food Firm Respond to Change

NEW YORK — Quick response to changing conditions is a necessity for every business and a small business system at Office Canteens here is helping this fast food firm keep up with the changes.

"Fast response to the profit and loss picture at each of our 89 units is absolutely essential in this business, and our minicomputer gives us the information we need to make the right management decision," according to Mark Grodin, controller.

The company provides cafeteria-style food to a number of Manhattan businesses.

"Before we installed our small business computer, we were sending all our data out to be processed by an IBM System 3 owned by another division of our corporation. But we weren't getting the information needed for management decisions," Grodin said.

Search for a System

"About a year and a half ago, we looked at a number of stand-alone systems, including IBM, Sycor, Inc. and Singer as well as a time-sharing service, but they simply could not handle our order processing application," Grodin said.

"Futhermore, we found the Basic/Four Corp. system's response to the operator was faster than any of the others we looked at.

"We also like its flexibility, its many program adaptations and the fact it was an interactive, on-line system," he added.

With the help of an outside programming services firm recommended by Basic/Four — Parthenon Systems Ltd. — Office Canteens installed a Basic/Four 32K Model 400 system with disk drive, three video display terminals and medium-speed printer.

"When we saw what the computer could do — especially with the excellent service we received from our programmers — we decided to expand the system to two disk drives and four CRTs," Grodin said.

The system has again become too small, he added. Like many small business system users, the firm kept increasing the number of applications it put on its small system until it reached the limit that could be adequately handled.

It expects to upgrade within the Basic/Four line "as soon as the proposal is approved," Grodin noted.

Applications Performed

Applications currently performed on the computer include processing daily food orders from cafeteria units; accounts payable, accounts receivable and general ledger; determining weekly profit and loss for each cafeteria unit; and control of inventories kept at these units.

"Two of our terminals are used the entire day just to take orders," Grodin explained. "The third terminal handles accounting applications and the fourth is used to put inventory data that is taken each week at our units into the computer.

"All four terminals are in use 90% of the time," he said.

"There's no doubt in our minds that this on-line way of working is saving a great deal of time, as well as giving us more and better reports than we had before," Grodin added.

"We now finish our weekly reports on Wednesdays. In the days when we had to send our information out for processing, we didn't get these reports back until Friday."

In all, approximately 40 reports and listings are being produced by Office Canteens' system.

Among the most important of these are the weekly profit and loss report and weekly food cost report for each canteen unit; inventory price change report; monthly summary of general ledger postings; accounts payable open invoice report; accounts receivable summary and detailed aged trial balance reports; and an order status report showing what is shipped to each unit each day.

"I think the key advantage this system brings to us is summed up in the word 'response,'" Grodin said.

"For instance, our open invoice report in accounts payable shows all our unpaid invoices, and it's automatically up-to-date at any time we ask for it.

"And our accounts receivable aged trial balance reports help us respond better to accounts past due. Before it just took too long to process this information," he said.

"We're still finding more ways of putting this computer to work," he added. "We're putting cash receipts on the system now, in addition to developing new reports to help us monitor our cafeteria units better.

"And we also expect to put our payroll on within the next year or so — and save ourselves about $10,000 a year over what it costs to have it done outside," he added.

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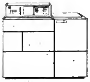
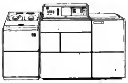
Komstar 100 microimage processor—on-line to IBM S360/370 computers, for distributed processing.



Komstar 200 microimage processor—intelligent, on-line to IBM S360/370 computers, saves CPU formatting time.



Komstar 300 microimage processor—intelligent, off-line COM, formats print tapes from most major mainframes.

For the detailed story, write Eastman Kodak Company,
Business Systems Markets Division, DP-7915, Rochester, N.Y. 14650.

KODAK KOMSTAR Microimage Processors

Kodak

System Handles Credit Unions

MIDDLEBURY, Conn.—A minicomputer-based turnkey system for credit unions is available from Computeristics.

The on-line, interactive Value-Cu system was designed for credit unions with about 2,000 members. It can handle transactions for share deposits and withdrawals, loan payments and disbursements as well as automatic transactions such as payroll deposits.

Management reports including trial balances and delinquency reports can be produced by the system, the company noted.

The Value-Cu is based on a Data General Nova 3 CPU with 32K words of memory; a 165 char./sec serial matrix printer; a 10M-byte Novadisk with 5M bytes of fixed and 5M bytes of removable storage; and one to three CRTs.

Prices for this typical system range from $39,000 with one CRT to $46,000 with three CRTs. Computeristics is located in the Oxford Management and Research Center, Middlebury, Conn. 06749.

Based on I-8250

NCR Turnkey Works for Moving Firms

DAYTON, Ohio — NCR Corp. has introduced an interactive turnkey system for the moving and storage industry.

Based on the NCR I-8250, the turnkey was designed for the local moving and storage agent associated with a national van line, the vendor said.

Using software written in Cobol 74, the system includes a basic module that performs sales processing, accounts receivable and general ledger.

From data input via CRTs, the system produces over 25 management reports. These include daily and monthly local and van line sales journals, salesmen and driver reports, invoices, commission statements, claims registers and general accounting reports.

The basic hardware includes a 64K-byte I-8250 with a single CRT, 9.8M bytes of disk with one fixed and one removable platter, magnetic tape cassette unit and a 173 char./sec matrix printer.

The basic software module costs $85/mo with an initial $4,075 installation fee which includes application customizing services. The basic hardware costs $46,420 or $1,315/mo on a five-year agreement.

Optional Applications

Optional application modules include order processing for $15/mo, accounts payable for $15/mo and payroll for $35/mo. The optional modules produce about 20 additional management reports, NCR said from Dayton, Ohio 45479.

DP Book Club Serves Hobbyists

TAMPA, Fla.—The Computer Hobbyist Book Club has been formed as a source of computer books for the hobbyist or the professional.

The books are sold at below standard prices, the firm said.

There is no obligation or minimum purchase requirement and subscribers can cancel at any time, a spokesman added.

A book description bulletin is sent every four weeks; at that time, a choice, if any, is indicated, the company said.

Additional information is available from Computer Hobbyist Book Club, 5405B Southern Comfort Blvd., Tampa, Fla. 33614.

IEC Enhances Drilling Monitor

ANAHEIM, Calif. — Interstate Electronics Corp. (IEC) has enhanced its minicomputer-based Adaptive Data Reporting System (ADRS), designed for environmental monitoring of offshore drilling and production platforms. The system can measure wave height, wind speed and direction, ocean currents, air temperature and platform motion on all axes, the firm said.

Based on PDP/8A

Based on a Digital Equipment Corp. PDP-8/A, ADRS also monitors parameters such as rig position, riser angle, ballast conditions, structural stresses and mooring line tension. Trend plots are available from the system as well, a spokesman noted.

The updated ADRS system features a more powerful operating system and can support multiple remote terminals. The basic system is priced below $100,000, the IEC firm noted from 707 E. Vermont Ave., Anaheim, Calif. 92803.

DISK SAVINGS

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Any Sector	
2315-	57.50
5440-	65.00
DATA MODULES	
Trident-80 mb	375.00
CDC 9762-80 mb	375.00
3348-70	1225.00
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The OMEGA 480 Systems are available initially in: Boston, New York City, Philadelphia, Washington, Baltimore and Atlanta; Cleveland, Chicago, Detroit, Milwaukee, Minneapolis, Dallas and Houston; Denver, Portland, Los Angeles and San Francisco. For information phone your local Control Data Representative or write Thomas E. Phillips, Vice President, Peripheral Systems Marketing, Control Data Corp., P.O. Box 0, Minneapolis, MN 55440.

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Welcome to NCC '77

Computerworld Previews Events in 'Big D'

Downtown Dallas

1. **ADOLPHUS HOTEL**
   Commerce and Akard
2. **BAKER HOTEL**
   Commerce and Akard
3. **DALLAS HILTON**
   1914 Commerce
4. **FAIRMONT HOTEL**
   Ross and Akard
5. **HOLIDAY INN-DOWNTOWN**
   Elm and Griffin
6. **HYATT REGENCY HOTEL**
   Reunion (Open June, 1978)
7. **MILNER PLAZA HOTEL**
   1933 Main
8. **RAMADA INN-CONVENTION CENTER**
   1011 S. Akard St.
9. **SHERATON-DALLAS HOTEL**
   Southland Center
10. **AMTRAK & SURTRAN TERMINAL**
    400 S. Houston
11. **CONVENTION CENTER**
    717 S. Akard
    Akard and Griffin and Canton
12. **OLD CITY PARK**
13. **REUNION TOWER**
14. **THANKS-GIVING SQUARE**

Prepared by Dallas Convention
and Tourism Bureau
Dallas Chamber of Commerce
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651-1020

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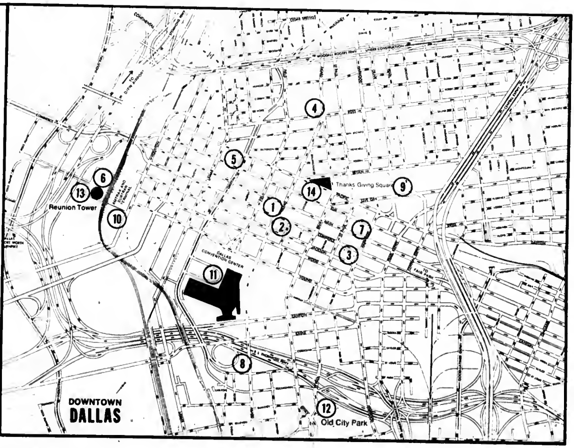

'A Personality All Its Own'

NCC Will Focus on User, Feature Personal Computing

Key figures at NCC are (clockwise from left) Portia Isaacson, conference chairwoman; Robert R. Korfhage, program chairman; Mark Shepherd Jr., keynote speaker; and A. Douglas Murch, plenary speaker.

By Toni Wiseman
Of the CW Staff

DALLAS — This year's National Computer Conference (NCC) is going to have "a personality all its own," characterized by user orientation and an emphasis on personal computing, according to Portia Isaacson, the woman hehind the whole project.

"There are going to be fewer of the really technical papers this year and I think that's what NCC should be," Isaacson said.

"We now have a number of fine, highly technical conferences, primarily sponsored by the Association of Computing Machinery and the Institute of Electrical and Electronic Engineers and NCC's purpose really is more to serve the user than it is to serve the researcher."

After almost two years of planning, scheduling and managing, the NCC '77 chairwoman is looking forward to the conference's actual occurrence with an anticipation she equated with giving birth.

Isaacson has done virtually nothing but eat, sleep and live NCC for the last year. In fact, being chairwoman is such a full-time job, she only taught one course this year at the University of Texas, where she is an assistant professor of mathematical sciences.

"This is an enormous project — one whose schedule cannot slide. The NCC is going to run June 13-16 whether we are ready or not," she seid.

A Fresh Approach

"Users come to see the exhibits and they want a program that suits their needs, end those are not necessarily researchy-type things," she said, noting that in addition to the sessions, a series of one-day seminars or mini courses has been scheduled.

Isaacson is also enthusiastic about the emphasis on personal computing.

Surveys have shown that up to 80% of those involved in hobby computing are either computer professionals or at least on the fringe of the industry, she noted.

"So what we're really hoping is that the personal computing area will motivate people to say: 'Well this reelly is an interesting or different NCC; I think I'll go to this one'.

"I think the personal computing program, the seminars and the national champion programmer contest will provide people with an interest, an incentive, to come," she added.

Designing the Conference

Two years ago, Isaacson hegan putting together her steering committee of 15 persons, each of whom has a subcommittee. This means Isaacson was a third-level manager for a project of more than 50 people.

And, while she delegated a large portion of matters pertaining to sessions, speakers and papers to Robert R. Korfhage, professor of computer science et Southern Methodist University and this year's program chairman, Isaacson was still responsible for every item of publicity which appeared and other "fringe activities."

"The conference chairwoman has the prerogative to determine everything about the conference," she stated.

For instance, Isaacson is responsible for the choice of plenary and keynote speakers.

Positive Indicators of Attendance

While hesitant to make even a tentative guess at the number of attendees for this year, Isaacson said there have been a couple of positive indicators. Advance paid registration is running 25% ahead of this time last year, she indiceted.

"Another good sign is that the hotel rooms we had originally reserved are now full and we're going further out [of town] to add more hotels to our list to accommodate everyone," she noted.

As for the advantages and disadvantages of holding the NCC in Dallas rather than on one of either coasts, Isaacson said, "It's definitely true that we're not the population center that New York or California is, "but, on the other hand, people in Texas are used to traveling to Austin or Houston for a day trip.

Isaacson pointed out that the Fall Joint in Houston seven years ago had 50% of its attendance from outside the Houston area, whereas NCC is usually 75% local.

THE **"SYSTEM"**

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IN **SYSTEMS**-HOUSES

What to Do . . .

. . . Night and Day . . .

. . . And How to Get There

By Nancy French
Of the CW Staff

Mansions and Memorials

Dallas visitors from places where trees and grass are commonplace will see the struggle Texans must wage to bring civilization to their dusty earth — and most have done a remarkable job.

A drive down Inwood Road will give some insight into the rich Texan's competitive nature. There each home seems larger, or at least more elaborate, than the last. Some front yards are even adorned with Greek statues.

Most of the golf and tennis clubs are also located in this area.

If you have time, drive through the original Highland Park area — which includes Turtle Creek, Beverly Drive, Lakeside Drive, Armstrong Street and St. Johns.

As for points of interest closer to the city, the John F. Kennedy Memorial Plaza at Main and Market streets at the west end of town is a grim reminder of what happened there 13 years ago.

The memorial is a cenotaph 30 feet high surrounded by a block of black granite, signifying an open tomb for communion.

The John F. Kennedy Museum at 501 Elm — a short cab ride from the convention center and within walking distance of the Holiday Inn — features "The Incredible Hours,' a sound, light and film presentation of that unforgettable day in American history. In addition, a collection of paintings, official photographs and other memorabilia is housed at the museum, open daily from 9 a.m. to 5 p.m. Admission is $1.50. For information call 742-8582.

On a more cheerful note, conventioneers who like rich desserts and would welcome a walk in the Dallas sunshine at noon might enjoy a stroll down to the world-famous Nieman Marcus department store to feast on a cup of home-made style soup du jour, fruit salad with luscious poppy seed dressing and a piece of three-inch high, fresh-baked apple pie or rich and gooey mocha or chocolate cake.

These Nieman's specialties — a far cry from the usual convention fare of hot dogs and colas — are available at Nieman's first-floor Expresso Bar.

The Observation Terrace on the 50th floor of the First National Bank, at Elm and Akard, offers a panoramic view of Dallas — now the nation's eighth largest city. The Terrace is open Monday through Saturday from 9 a.m. Admission is 25 cents, with proceeds donated to charity.

Thanks-Giving Square, an island of serenity surrounded by Akard, Ervay, Bryan and Pacific streets, affirms the reality of gratitude as a common root of great religions and society. The square is open Monday through Friday from 8:30 a.m. until 5:30 p.m.

The John Neely Bryan Cabin at Main and Market across from the JFK Memorial is the first house built in Dallas. The log cabin, which dates back to 1841, is part of the Dallas County Historical Plaza.

If you have a free afternoon, take a drive out to Fair Park, the site of the annual state fair each October. There you'll find the famous Cotton Bowl as well as the Music Hall, Texas Hall of State and Wax World.

Fair Park is also the site of the Dallas Aquarium, the Railroad Museum, the Garden Center, the Health and Science Museum and Planetarium, the Museum of Fine Arts and the Museum of Natural History.

Those wishing to shop and willing to venture a bit out of town might wish to cab up to the Quadrangle. A bit further out on North Central Expressway is Northpark, a complete indoor shopping mall where Nieman Marcus as well as a host of other specialty and department stores are located.

For arts and crafts by local artisans, the Olla Podrida at Coit Road and the LBJ Freeway is the place to go.

The European Crossroads on Northwest Highway just west of Marsh Lane is another shopper's dream.

Discos and Dinner Theaters

While "Big D ain't the Big Apple," conventioneers looking for entertainment after the exhibit hall closes need not go home disappointed.

"Liquor by the drink" became law in 1971, so brown bagging is now a thing of the past. But Big D is a suburban town, and one would do best to have access to a car.

Greenville Avenue, between Lovers Lane and Northwest Highway (a local road parallel to North Central Expressway) is one of the city's two most popular disco enclaves. There, The Pawn Shop, Icabod's and TGI Friday's are highly regarded by Dallas singles. Some of these spots serve meals (see the restaurant guide beginning on the next page).

On the other side of town, on Northwest Highway, just west of Marsh Lane, one can find Carlos and Pepe and The Beggar's. Carlos and Pepe also serves food.

The nearby European Crossroads shopping center, also on Northwest, boasts no fewer than three popular spots. A visit to the Chelsea Street Bar for some of its "great Nachos" might be a good prelude to a visit to the No. 3 Lift or Saturday's, one Dallas single suggested.

In the category of live entertainment, singer Lena Horne will be featured at the Fairmont Hotel's Venetian Room.

Those interested in theater and supper theater might want to consider the following:

- Granny's Dinner Playhouse at 12205 Coit Road will feature Minskey's Burlesque. The theater opens at 6 p.m. with curtain time at 8:15 p.m.
- Country Dinner Playhouse at 11829 Abrams Road and LBJ Freeway (I-635) — a bit out of town — is presenting "Everybody's Girl" starring Rose Marie. The playhouse opens at 6 p.m., with curtain time at 8:15 p.m.
- Windmill Dinner Theatre, 6532 E. Northwest Highway at Abrams Road, will be featuring Tom Poston in "Stuffed Shirt." The performance is presented every day except Monday. The curtain goes up at 8 p.m.
- At Kalita Humphreys Theatre, part of the Dallas Theatre Center, conference-goers can treat themselves to a performance of "Equus." The center is at 3636 Turtle Creek. Curtain is 8 p.m. Tuesday through Friday.

Finding Your Way

If you're lucky enough to get a window seat, your first view of Dallas will be the Dallas/Fort Worth International Airport. The airport is huge, but don't let it throw you.

Head for the baggage claim and the sidewalk and look for the Surtran signs. Surtran is the system of ground transportation serving Dallas and its environs.

Surtran buses leave the airport about every half hour for Surtran's downtown Dallas terminal as well as most of the downtown hotels. Travel time to the terminal from the airport is about 35 minutes; a ride all the way to your hotel might take almost an hour.

A ticket to the downtown terminal costs $3 and to the hotels, $4.

Surtran taxi service runs about $14 and takes about 30 minutes.

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CONFERENCE AT A GLANCE (continued)

WEDNESDAY

		9:00 - 10:30	10:45 - 12:15	2:00 - 3:30	3:45 - 5:15
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N224-227		COMPUTER SYSTEMS: A GLOBAL VIEW *Roger M. Firestone* 44	SOFTWARE VALIDATION *Edward V. Resta* 51	PROGRAMMING LANGUAGES: HIGH-LEVEL PROGRAMMING FOR LOW-LEVEL MACHINES *Dennis J. Frailey* 58	PROGRAMMING LANGUAGE THEORY *Nancy A. Betz* 66
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BALLROOM D		EMERGING LEGAL ISSUES AND IMPACTS OF ELECTRONIC DATA PROCESSING *Susan H. Nycum* 46	IMPACT OF MICRO-COMPUTERS — 1980 *Robert R. White* 53	PROGRAMMABLE CALCULATORS IN BUSINESS *Julius S. Aronofsky* 60	
E400-410		CONTINUING EDUCATION FOR THE COMPUTER SPECIALIST *Ben Knowles* 47	COMMUNICATION AND EDUCATION *Della T. Bonnette* 54	COMPUTER SCIENCE PROGRAM ARTICULATION *Ronald P. Rhoten* 61	COMPUTERS IN THE PETROLEUM INDUSTRY *Olin G. Johnson* 68
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INTRODUCTION TO SOFTWARE PHYSICS — *Kenneth W. Kolence*, INSTITUTE FOR SOFTWARE ENGINEERING 8:30-4:30 N215-217
STRUCTURED DESIGN — *Edward Yourdon*, YOURDON, INC. 8:30-4:30 S412-413
EDP PROFESSIONAL DEVELOPMENT — *Larry K. Grodman*, O E D INFORMATION SCIENCES, INC. 8:30-4:30 N230-231

THURSDAY

	9:00 - 10:30	10:45 - 12:15	2:00 - 3:30	3:45 - 5:15
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	FAULT-TOLERANT COMPUTING — I *Francis P. Mathur* 70	FAULT-TOLERANT COMPUTING — II *T. R. N. Rao* 78	COMPUTER ARCHITECTURE DESIGN *James E. Brown* 84	
	REMOTE TERMINAL EMULATION *Marshall D. Abrams* 71	PERFORMANCE EVALUATION *Anita Cochran* 79	SPECIAL MEMORY ARCHITECTURES *William E. Cantrell* 85	
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HOW TO DEVELOP A LONG-RANGE DATA PROCESSING PLAN — *Ben Knowles*, BRANDON SYSTEMS INSTITUTE, INC. 8:30-4:30 N215-217

PLENARY SESSIONS

The '77 NCC will include three special plenary sessions open to all conference attendees Each will be held in the Theater of the Dallas Convention Center and will feature a major presentation by a nationally-recognized authority on a topic of critical significance to the computing field and to concerned members of the business community

In his keynote on Monday June 13 Mark Shepherd Jr . chairman of the board and chief executive officer of Texas Instruments Incorporated will assess the extension of distributed computing into new applications that were not predictable when the computer revolution began some 25 years ago On Tuesday June 14. AFIPS President Dr Theodore J Williams will deliver a presidential address in which he will analyze the critical role of the applications of computers to industrial systems with emphasis on industrial process monitoring and control Critical issues faced by data processing users will be scrutinized at Wednesday's Industry Plenary Session in a featured address by A Douglas Murch senior vice president of the Prudential Insurance Company of America Mr Murch will focus on current challenges of data processing in the insurance field

Keynote Address
Monday. June 13
10 a m., Theatre
Mark Shepherd, Jr
Chairman and Chief Executive Officer
Texas Instruments Incorporated

AFIPS Presidential Address
Tuesday June 14
1 p.m., Theatre
Dr Theodore J Williams
Professor of Engineering and
Director. Purdue Laboratory for
Applied Industrial Control
Purdue University

Industry Plenary Address
Wednesday. June 15
1 p m., Theatre
A Douglas Murch
Senior Vice President
Prudential Insurance Company of America

Foreign Sales Briefing
"The Marketing of Computers and
Related Equipment Abroad"
Tuesday. June 14 and Wednesday. June 15
10:45 a m.-12:15 p m., S414
George A Black, Jr.
U.S Department of Commerce, Dallas

CONFERENCE AT A GLANCE

MONDAY

		2:00 - 3 30	3:45 - 5:15
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	N224-227	COMPUTER GRAPHICS *Nancy A. Storch* 4	SYMBOLIC EVALUATION *Edward F. Miller, Jr.* 11
MANAGEMENT AND APPLICATIONS	BALLROOM C	DEVELOPMENTS IN COMPUTER OUTPUT MICROFILM (COM) AND MICROGRAPHIC TECHNOLOGY — PRESENT AND FUTURE *Don M. Avadon* 5	
	BALLROOM D	HOW TO SELL, SERVICE AND SUPPORT CUSTOMER NEEDS WITH SMALL BUSINESS COMPUTERS *Donald W. Fullar* 6	COMPUTER BASED INFORMATION SYSTEMS FOR THE SMALL FIRM *Frederick F. Nawpeck* 12
	E409-410	CLINICAL APPLICATIONS OF THE COMPUTER *Lynn L. Petarson* 7	THE COMING AGE OF COMPUTER BASED MEDICAL CONSULTATION WILL IT BE FAIR? *John Lackmann* 13
	THEATRE		

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	SELECTION METHODS FOR A FAMILY OF COMPUTER ARCHITECTURES *Y. S. Wu* 15		COMPUTER HARDWARE DESIGN *William P. Summers* 28	GOVERNMENT PANEL ON RESEARCH IN COMPUTER ARCHITECTURE *Jimmie R. Suttle* 36
	MICROPROCESSOR ARCHITECTURES *Charlas R. Vick* 16		OUTPUT — RESULTS AND RHETORIC *James O. Matous* 29	MAN-MACHINE INTERFACE *Seymour Jeffery* 37
	SOFTWARE MANAGEMENT: PLANNING FOR A NEW SOFTWARE DEVELOPMENT PROJECT *Richard H. Thayar* 17		DATA STRUCTURES *Julie E. K. Landstein* 30	MINI AND MICRO DESIGN MISTAKES *Helmut Thiess* 38
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	COMPUTER SYSTEMS IN HEALTH CARE DELIVERY AND MEDICAL LABORATORIES *William J. McClain* 20	EDUCATION FOR MEDICAL INFORMATION SCIENCE *Richard E. Pogue* 25	CODASYL VS. MUMPS FOR MEDICAL DATA BASE MANAGEMENT *Gio Wiederhold* 33	COMPUTER TECHNOLOGY IN THE INFORMATION/LIBRARY FIELD *Marilyn Johnson* 40
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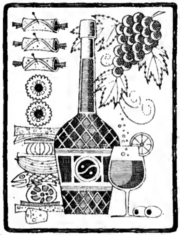
PROFESSIONAL SEMINARS	COMPARING DATA BASE SYSTEMS — *William E. Linn and Thomas F. Meurer*, CULLINANE CORPORATION 8:30-4:30 N230-231
	MICROPROCESSORS — *Adam Osborne*, OSBORNE & ASSOCIATES, INC. 8:30-4:30 N215-217
	SOFTWARE DESIGN TECHNIQUES — *Pater Fraaman and Anthony Wassarman*, SOFTWARE ENGINEERING CONSULTANTS 8:30-4:30 S412-413
	INTRODUCTION TO COMPUTER NETWORKS — *Ira W Cotton*, COMPUTER NETWORK ASSOCIATES 8:30-4:30 S411

Restaurants



AMERICAN

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Ciro's. 3237 McKinney Ave., 745-9484
Coco's Famous Hamburgers. 12910 Midway Rd., 247-2277. American food, specializing in hamburgers.
Crossroads Junction, Inc. 2828 W. Northwest Hwy., 350-5755. Specialty is steak, live entertainment.
Crystal Terrace Restaurant. Music Hall at Fair Park, 821-0591. Buffet featuring prime roast beef.
Good Times Restaurant and Bar. One Main Place, 744-1834. American food, entertainment.
J.B. Hamby's. 214 N. Akard St., 748-3426. Hamburgers, chicken fried steak.
Hamburgers by Jamie's. 3817 Lemmon Ave., 522-3580. Specializing in hamburgers and shoe string potatoes.
Harper's Corner. Hilton Inn Central, 5600 N. Central Expwy., 827-4100.
Houlihan's Old Place. 84 NorthPark East, 361-9426. Variety of dishes, antiques and curios in decor.
Ichabod's Restaurant. 5500 Greenville Ave. No. 201, 891-2648. Variety of American food.
Kitchen Kettle. 1603 Elm St. 741-2744. American food, Southern dishes.
Lucas B & B Restaurant. 3520 Oak Lawn Ave., 528-8525. Variety of food, informal atmosphere.
Mad Cap Molly's. 175 Walnut Hill Vlge., 350-5938. Sandwiches and bar.
Metro Food Shops, Inc. 3033 Gaston Ave., 821-5272. Variety of food, specializing in waffles. Informal atmosphere.
The Railhead. 8919 Twin Hills Ave., 369-8700. Antebellum railway station decor with live entertainment. Prime rib, steaks, lobster, Alaskan king crab specialties.
Raintree Restaurant. 2828 W. Northwest Hwy., 350-5755.
Southern Kitchen. West: 2358 W. Northwest Hwy., 352-5220. East: 6815 E. Northwest Hwy., 368-1658. Chicken, seafood, steaks and lobster tail. Old South decor.
T.G.I. Friday's. 5500 Greenville Ave., 363-5353. New York antique bar and restaurant.
Twenty One Turtle Creek Club of Dallas. 3883 Turtle Creek Blvd., 528-4090. Private club.
Victoria Station. 2910 Routh, 851-0381. Specializing in prime rib. Old railroad cars and British railway decor.
Walls's Catering and Restaurant. 10749 Preston Rd., 891-4444. Specializing in cheese blintzes, rolled cabbage and apple strudel. Contemporary decor.
Wycliffe Point, LTD., The. 2525 Wycliffe, Suite 130, 528-2030. Hamburgers.
Yolk's On You. 8202 Park Lane, 381-6511.

CONTINENTAL

Arthur's. 8350 Northwest Hwy. in Campbell Centre, 361-8833. Elegant decor. Specialing in prime steaks, seafood and crab Lorenzo.
Bagatelle Restaurant. 4925 Greenville Ave., 892-8224. European gourmet cuisine, semiformal atmosphere.
Ballmaster Restaurant and Club. 13601 Preston Rd., 861-9353. Continental dishes, seafood specialties, live entertainment.
Brennan's Restaurant. One Main Place, Plaza level, 742-1911. Specializing in French and Creole cuisine. Featuring "Breakfast at Brennan's."
Carlos & Pepe. 3049 W. Northwest Hwy., 358-4357.
Chateaubriand. 2515 McKinney, 741-1223. Specializing in French and continental food. Greek decor.
Enclave Restaurant and Club. 8325 Walnut Hill Ln., 383-7487. Continental food specializing in meat entrees. Formal decor.
Ewald's. 5415 W. Lovers Ln. 357-1822. Continental specialties including veal, fish and beef. Continental decor.
1520 A.D. 3800 W. Northwest Hwy., 350-5748. Dinner theater, medieval English decor.
Gran' Crystal Palace Theatre. 2424 Swiss Ave., 824-1283. Dinner theater, formal dining.
Grape Restaurant, The. 2808 Greenville Ave. 823-0133. European cafe specializing in cheese, wine, homemade soups.
Mario's. 135 Turtle Creek Vlg., 521-1135. Elegant, intimate decor. Specializing in continental cuisine.
Mr. Peppe. 5617 W. Lovers Ln., 352-5978. Specializing in pepper steak, veal cordon bleu, rack of lamb.
Old House. 5720 E. Mockingbird Ln., 821-9200.
Papillon. 7940 N. Central Expwy., 891-7455.
World Trade Center Club. 2050 Stemmons Pwy., 744-1104. Specializing in international cuisine. Elegant Southwestern decor.

FRENCH

Calluaud's Restaurant. 2917 Fairmount, 745-9571. French cuisine specializing in Quiche Lorraine, fresh salmon, steak au poivre vert.
Chablis. 125 The Quadrangle, 651-0290.
La Vieille Varsovie. 2610 Maple, 528-0032. Specializing in French cuisine. Old world atmosphere.
Le Bistro. 3716 Bowser, 528-4181. French food, formal atmosphere.
Marcal's Restaurant. 5721 W. Lovers Ln., 358-2103. French chef-owner specializes in dover sole and Beef Wellington, French provincial decor.
Patry's Restaurant. 2504 McKinney, 748-3754. Specialties are chicken marinated, roast rack of lamb and duck.
Pyramid Room. Fairmont Hotel, Ross and Akard, 748-5454. Gourmet food.

GERMAN

Black Forest Bakery. 5819 Blackwell, 368-4490.
Blue Front Restaurant. 1310 Elm St., lower level, 741-7560. Specializing in pig knuckles, polish sausage, potato salad and homemade soups.
Jagerstube Restaurant. 7811 Inwood Rd., 352-5812. German food.

GRECIAN

Goldfinger. 2905 Cridelle, 350-6983. Specializing in Greek and continental food. Modern Greek decor.
The Torch. 3620 W. Davis, 331-5221. Specializing in Greek cuisine. Greek decor.
Zorba Greek Cafe. 202 N. Ervay, 745-9369. Greek Food.

ITALIAN

Gino's Restaurant. 5217 Ross Ave., 824-1410. Italian specialties. Family atmosphere.
Godfather, The. 6550 Abrams, 341-8724. Italian specialties.
Ianni's Italian Restaurant. 2230 Greenville Ave., 828-8181. Italian garden decor. Specializing in homemade pastas and Italian delicacies.
Il Sorrento. 8618 Turle Creek Blvd., 352-8759. Old Italian decor. Classical Italian cuisine specializing in hot antipasto, cannelloni and veal zingara.
Old Spaghetti Warehouse. 1814 N. Market, 851-8475. Specializing in spaghetti and lasagna with San Francisco sour dough bread. Authentic antique decor.

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☐ UCC FIFTEEN (Restart/Recovery Management System)
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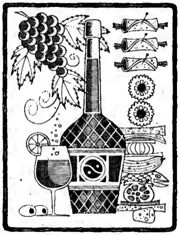
Restaurants



MEXICAN

A. Mariano's. Old Town Vlg., Greenville at Lovers Ln., 691-3888. Mexican atmosphere. Specializing in authentic and Texas-style Mexican cuisine.

Annie's Santa Fe. 6881 Greenville Ave., 369-8600.

Casa Dominguez. 2127 Cedar Springs, 742-4945. Specializing in Austin, Texas-style Mexican food. Spanish cantina decor.

Chiquita Restaurant. 3325 Oak Lawn, 521-0721. Specializing in carne asade, chiles rellenos and fleutas. Spanish decor.

Desperados. 4818 Greenville at University, 363-1850. Gourmet Mexican and Tex-Mex specialties. Mexican cantina atmosphere.

El Chico. 2031 Abrams, 821-5785; 165 Inwood, 352-3307; 305 Medellion Ctr., 363-0584; 110 W. Davis, 943-8610; 707 Preston Royal Vlge., 363-2671; 13247 Montfort, 661-2772; 3353 W. Northwest Hwy., 357-8264; 5412 E. Mockingbird, 827-2500. Specializing in Mexican food. Spanish decor.

Esperanza Restaurant. 1928 Bryan St., 747-5782. Mexican food.

Los Mexicanos. 2525 Wycliff, Suite 126, 528-8180. Mexican food, informal atmosphere.

Pedro's Restaurant. 2905 Greenville Ave., 823-1641. Mexican food.

Raphael's. 3701 McKinney Ave., 521-9640. Mexican food.

Tupinamba Restaurant. 3071 W. Northwest Hwy., 352-8570.

Villa Placita Restaurant and Club. 13020 Preston Rd., 661-8354. Mexican cuisine and decor.

STEAK HOUSE

Baby Doe's Matchless Mines. 305 Harry Hins Blvd., 741-9771.

Bobby McGee's Conglomeration Restaurant. 6400 E. Mockingbird in Hillside Vlge., 826-9020. Specializing in steak, lobster and prime rib. Antique decor.

Bodega Restaurants of Texas. 12810 Hillcrest, 233-6627. Steak, beef.

Bavarian Steak House. 7724 N. Central Expwy., 363-7848. Specializing in prime rib, steaks, seafood, fowl and beef fondue. Bavarian hunting lodge decor.

Charco Broiler Steak House. 413 W. Jefferson, 942-6806. Modern decor Specializing in steaks

Daddy$ Money. 5500 Greenville Ave., 363-8686. Specializing in steaks, lamb and scampi. Simplistic elegant decor.

Jamil's Steak House. 2907 W Northwest Hwy., 352-9071. Specializing in steaks, lobster tails and rib dinners. Mediterranean decor.

Kirby's Charcoal Steaks, Inc. 3715 Greenville Ave., 823-7296. Contemporary decor. Specializing in steaks

Old San Francisco Steak House. 10965 Composite Dr., 357-0484. Steaks, live entertainment

Pelican's Wharf. Northwest Hwy. at Skillman, 361-9813. Specializing in aged beef, king crab, lobster, prime rib. California beach and wharf decor

Randy Tar Restaurant. 7034 Greenville Ave., 691-7102. Steaks

Unique Steak & Seafood House. 1500 Commerce, 742-6304 Specializing in lobster, shrimp, seafood, steaks and prime rib Modern decor.

TEXAS SPECIALTIES

Big Al's Barbeque #2. 1807 Main St., 651-0382

Buckboard Barbecue. 1330 W Pioneer, 259-3525 Barbeque beef, pork, etc

Bump's Smokehouse & Saloon. 5734 E. Lovers Ln., 691-7320.

Elliott's Hickory Dock. 4230 Oak Lawn, 526-9588 Barbecue beef, pork.

Genghis Khan Mongolian Feast. 4830 Greenville Ave., 361-0280. Unusual barbecue.

Henriette's Bar B-Q & Club. 2701 Live Oak, 823-9360. Barbecue.

Johnny's Barbecue Roundup. 274 Exchange Park North, 352-9295. Specializing in barbecue beef, sausage, ham, ribs and hot links. American conventional decor.

Randy's Barbecue Restaurant. 3260 Irving Blvd., 838-3692. Barbaque sandwiches and plates.

Roe's Pit Barbeque. 1414 N. Industrial Blvd., 747-9033. Specializing in barbecue, beef, ham, ribs, chili and Southern-style breakfast.

Tolbert's Texas Chili Parlor. 802 Main, 742-6336. The "chili parlor" and Museum of Chili Culture is run by one of the founders of the Chili Appreciation Society International, Dallas News columnist Frank X. Tolbert.

ORIENTAL

Benihana of Tokyo, Inc. 12700 Park Central Place, 387-4404 Japanese food cooked on the table.

Canton Restaurant. 5519 W. Lovers Ln., 357-4488. Specializing in Chinese food.

China Clipper Cafe. 3930 McKinney, 528-9185.

China Inn Restaurant. 6521 E. Northwest Hwy., 369-7733. Cantonese dishes, intimate decor.

Chinese Palace Restaurant. 10011 Harry Hines, 350-7192. Chinese decor. Specializing in Cantonese cuisine.

Chu's Restaurant. 15080 Beltway Dr., Addison, 387-1776.

Ho Toy Chinese Restaurant. 3411 McKinney Ave., 522-8431.

Hoho. 341 Hillside Vlge., 826-0980.

House of Gong. 3726 W. Northwest Hwy., 352-8248. Specializing in Chinese and American food. Oriental decor.

Hunan Chinese Restaurant. 2230 Greenville Ave., 826-8161. Spicy Chinese food, small, intimate decor.

Japanese Steak House. 9515 Overlake, 357-4091. Specializing in tempura, teriyaki steaks, sukiyaki and teppanyaki. Japanese decor.

Kobawoo Restaurant and Food Store. 5732 Cedar Springs, 350-1072. Oriental and exotic foods.

Kowloon Restaurant. 4117 Lemmon Ave., 528-9980. Chinese food. Oriental decor.

Lim Yee Cafe. 2007 Abrams, 824-9503.

Royal China Restaurant. 7525 Greenville Ave., 388-3304. Specializing in teppanyaki, teriyaki, tariyaki, sukiyaki and tempura. Japanese decor.

Sing's Chinese Restaurant. 210 Preston Royal Shopping Ctr., 381-1771. Chinese food.

Royal Tokyo Restaurant. 8409 Preston Rd., 368-4303. Chinese specialties. Oriental decor.

QUICK LUNCH

Bake Charbroilers. 14 locations in Dallas.

Great Outdoor Sub Shop. 325 N. Akard, 742-0984. Specializing in submarine sandwiches and ice cream. Ecological decor.

New York Sub-Way. 1705 Live Oak, 744-2371. Eastern-style submarine sandwiches. Bright decor.

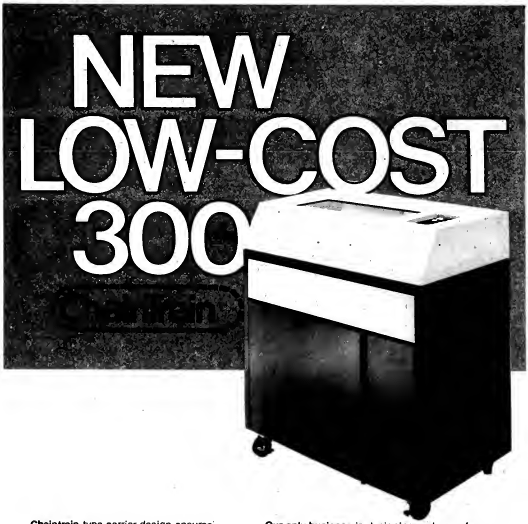
Neiman Marcus Expresso Bar. Main at Ervay. Soups, fruit salad, some sandwiches and elaborate desserts.

Sanger-Harris Hasty Buffet and Delicatessen. Pacific and Akard, 651-2424.

Sub-Total Submarine Sandwich Shop. 1322 Elm St., 741-4211. Submarine sandwiches.

Titche's Buffet and Malt Bar. Main, Elm and St. Paul, 748-4811.

Top of the Stairs, The. 1404 Main St., second floor, 742-0008.



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NCC Booth #1133

Communications at NCC

Harris Corp.

DALLAS - Harris Corp.'s Data Communications Division will be demonstrating the Model 1600 distributed processing system and the 8180 intelligent terminal system in Booth 1333.

Auxiliary memory and a line of remote printers for the Model 1600 family are also among the new products scheduled to be shown for the first time..

The 1600 is equipped with peripherals including a card reader, magnetic tape drive, eight CRT stations and the Model 1676-99 remote printer – one of three recently introduced printers from the firm.

It will be shown performing remote batch emulation, source data entry and a data base inquiry/response application, according to a spokesman.

Harris 8180

The three remote printers were designed mainly for hard-copy output of CRT terminal displays, but also can produce reports directly from a 1600 processor.

The models include a 90- to 240 line/-min printer, an 888 char./sec matrix printer and a 15 char./sec typewriter printer. Printer/CRT combinations may operate locally with the 1600 or from remote sites, the spokesman noted.

The auxiliary memory for the 1600 allows users to expand the number of local and remote data entry terminals and programs they can run concurrently with remote batch operations, according to the spokesman. The memory will be available in 16K-byte and 32K-byte increments.

The 8180 is formerly from Sanders Data Systems, which Harris acquired earlier this year.

The system, which can Include up to 32 keyboard/display units, 32 printers and buffer memory in addition to dual diskette or cartridge disk storage, emulates the IBM 3270, the spokesman said.

In addition, it will be shown emulating terminals used with Burroughs, Honeywell and Univac mainframes at NCC; he noted.

Other products which will share the limelight at the Harris booth include the Model 500 entry-level remote batch terminals and the mid-range 1200 family of remote intelligent batch terminals.

Harris' Data Communications Division is at 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234.

Teletype Corp.

DALLAS – Visitors to Booth 1505 will be able to view Teletype Corp.'s Model 40/4 series of keyboard display and printer devices, which offer synchronous Ascii or Ebcdic communications over multipoint private-line facilities.

The units can be clustered in groups of one to 36 devices and have speeds of 2,400-, 4,800- or 7,200 bit/sec, according to a spokesman. The 40/4 terminals have computer-controlled formatting and employ binary synchronous protocol.

In addition to the 40/4 series, Teletype will also exhibit its Model 43 matrix teleprinter featuring 30 char./sec operation, up/low printing and 132-column format capability.

It costs $1,205 from the firm at 5555 Touhy Ave., Skokie, Ill. 60076.

Universal Data Systems

DALLAS – Universal Data Systems plans to show its line of communications testers and modems in Booths 1601 and 1603.

The Comtest tester, priced at $7,150, is a microprocessor-based unit that can operate in either full- or half-duplex mode and contains a 16-line, 512-character CRT display. It can monitor an entire communications system or can emulate either the CPU or various terminal devices, the firm said.

The data buffer can store, retrieve and display up to 1,500 characters with optional expansion to 3,500 charaoters, the firm added.

The UDS 12-12 modem, available in single model stand-alone configuration, rack-mounted packages or in ultimate modem racks, has two-wire full-duplex 1,200 bit/sec capability and its interface conforms to RS-232C interface standards, the company added from 4900 Bradford Drive, Huntsville, Ala. 35805.

An Editing Pet That

The perfect editing terminal for transaction processing must be more than a little bit smart. It has to be wise like our OWL-1200. With features that assure high accuracy source data entry, fast data editing, simplified host computer programming, and reduced host computer loading.

Our OWL gives you all the human engineering features you get with our FOX-1100, plus a lot more. And the price is right. Just $1496 in quantities of 25.

Check the comparison chart of editing terminals to see all the reasons why the OWL-1200 is simply "incomparable."

		PERKIN-ELMER	HAZEL-TINE	LEAR SIEGLER		ADDS
USER REQUIREMENT	FEATURES	OWL-1200	MOD. I EDITING	ADM-1A	ADM-2	980
High Operator Data Entry Accuracy	Protected fields	Yes	Yes	Yes	Yes	Yes
	Low-intensity fields	Yes	Yes	Partial	Partial	Partial
	Numeric only fields	Yes	Yes	No	No	No
	Inverse video fields	Yes	Yes	No	No	No
	Blink fields	Yes	Yes	No	Yes	Yes
	Line drawing capability	Yes	No	No	No	Yes
Simple, Fast Editing of Data	Insert/delete character	Yes	Yes	Partial¹	Yes	Yes
	Insert/delete line	Yes	Yes	Partial¹	Yes	Yes
Minimized Loading on Host Computer	Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header.	Yes	No	No	No	No
Simplified Programming	Ability of host CPU to read device status	Yes	No	No	No	No
	Ability of host CPU to read device mode key settings and communication option straps	Yes	No	No	No	No
	Program override on mode key settings	Yes	No	No	Yes	No
Simplified Program Debugging	Transparent mode permits all characters to be displayed	Yes	No	No	No	No
Cost Effectiveness	OEM price in quantities of 25*	$1496	$1670	~~$1795~~ * $1595	~~$2395~~ * $2095	$1995

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters.

¹No Key. Requires Two Key Code

* Just announced price changes

PERKIN-ELMER DATA SYSTEMS | TERMINALS DIVISION

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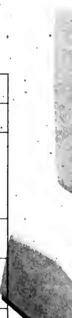


Communications at NCC

Wavetek Data Communications

DALLAS – The ADC 1500 controller for computer/communications systems will be on display in Booth 1253 by Wavetek Data Communications.

The ADC 1500 will handle up to 32 I/O lines with receive data sets in two-line increments and provides up to 123 tracks (32-word increments).

Unit Features

The unit features Touch-Tone input/voice output; Touch-Tone input/FSK output; Ascii speeds of 110-, 150- and 300 bit/sec; simultaneous operation of multiple I/O lines; and a remote diagnostic capability.

The voice response is from prerecorded words or phrases on addressable tracks up to the maximum of 123, the firm said, adding the playback time is .5 sec/track.

Interface Links

The unit can interface to a host computer over a 1,200 bit/sec Ascii channel or up to 9,600 bit/sec over a Bisync III link.

Wavetek is at P.O. Box 651, San Diego, Calif. 92112.

Codex Corp.

DALLAS – Booths 2062 and 2063 will house a variety of Codex Corp. data communications equipment including the 600 series of network processors, the multipoint network control system, the circuit quality monitoring system, the LSI series of modems and the 900 series of time division multiplexers.

The 6030 intelligent network processor, priced at $230/mo on a three-year lease, functions as a statistical multiplexer and features dynamic allocation of bandwidth and data compression. The unit comes in various models to handle from 28 ports up to 124 ports and the standard asynchronous speeds supported include 75-, 110-, 134.5-, 150-, 300-, 600- and 1,200 bit/sec with other speeds available as options.

Circuit Quality Monitor

The circuit quality monitoring system, priced at $175/mo on a three-year lease; can monitor, test and diagnose network performance by monitoring and storing tape coefficients, eye patterns, hits, line degradations and error coefficients. The unit monitors up to 64 modems from one console and features a synchronous and asynchronous test set, the firm said.

The multipoint network control system features central site diagnosis of multipoint network faults, programmable system restoral functions and local and remote antistreaming functions. It costs $155/mo on a three-year lease.

In addition, eight modems will be on display, the firm said from 15 Riverdale Ave., Newton, Mass. 02195.

Vadic Corp.

DALLAS – Vadic Corp. will show the Model VA317S direct connect 300 bit/-sec modem and a line of data access arrangements in its display in Booths 1835 and 1837.

The VA317S was the first modem to be registered by the Federal Communications Commission for direct connection with the switched telephone network under the full long-form registration process. The unit includes the necessary protective circuitry to hook up to the network without the use of a Data Access Arrangement (DAA) from the telephone company.

The Vadic VA317S modem has been approved by the FCC for direct connection to the switched telephone network via the jack-and-plug arrangement shown above.

The unit operates in automatic answer mode and is a direct replacement for the Bell System Model 113B, Vadic said. Up to 16 of the devices are housed in a 7-in. high chassis and the modem has analog and digital loop-back, as well as an 8-LED interface display unit and built-in data source for on-line testing, the firm said. It costs $240.

DAA Debuts

The DAAs to be introduced at the show include units compatible with the Bell models CDT, CBS and CBT. The units are available in stand-alone and rack-mounted models as well as card-only configurations. The automatic DAAs cost $100, the firm said from 505 East Middlefield Road, Mountain View, Calif. 94043.

Please send me more information on the OWL 1200.
Attach your business card here.

Communications at NCC

Telcon Industries

DALLAS – The Datamax 6 communications processor from Telcon Industries, Inc. will be exhibited in Booth 1883.

The unit, available in wall-mounted and desk-top models, can have between 4K and 16K of memory and features data rates up to 4,800 bit/sec. The basic CPU is priced at $795, with options priced separately, the firm noted from Ft. Lauderdale, Fla. 33315.

Western Union Information Systems

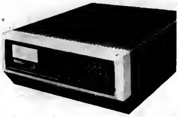
DALLAS – Booths 1166 and 1168 will be the site for a demonstration of Western Union Information Systems' intelligent time division multiplexer, the System 4100.

Although announced last year, the unit has been enhanced so that it has high-level data link control (HDLC) and statistical multiplexing, the firm said, as well as the capability of combining asynchronous and synchronous traffic. The trunk line protocol used with the system provides for multinodal networks, and users can single-end the System 4100 by programming an intelligent front-end processor to carry out the multiplexing and demultiplexing functions, Western Union said.

Throughput can be up to 9,600 bit/sec in each direction simultaneously, the firm added, and the system can also terminate synchronous terminal lines with speeds up to 7,200 bit/sec and asynchronous lines with speeds up to 1,200 bit/sec.

The lines may be two- or four-wire, half- or full-duplex and use current loop, EIA or CCITT -V.24 terminations, the company said.

Control of the unit is handled by an 8-bit microprocessor which can address up to 64K bytes of read-only memory, programmable read-only memory or random-access memory with its 16-bit address lines. The instruction repertoire includes 72 variable length instructions, seven addressing modes, a variable length stack-in memory, vectored restart and maskable interrupt. Cycle time is 1 µsec and average instruction execution is from 2 µsec to 4 µsec, the firm claimed.



System 4100

The unit is priced at $5,930 in a configuration that can support up to 16 lines.

In addition, Western Union Information Systems will also display its Data Set 4196, an LSI modem that provides transmission rates of 4,800-, 7,200- or 9,600 bit/sec, switch-selectable. Operation of the unit, which costs $6,500, is the full-duplex mode in synchronous bit serial form over a four-wire 3002-type channel, the firm said from 82 McKee Drive, Mahwah, N.J. 07430.

Network Systems

DALLAS – Network Systems Corp., a first-time exhibitor at NCC, will display the Hyperbus and the Hyperchannel – two products designed to speed network communications.

Hyperbus provides a means to transfer data between devices over a single coaxial cable, according to a spokesman. Up to 64 minicomputers or terminals can be connected at distances up to 1,000 feet at 50M bit/sec and up to 1 mile at 1.5M bit/sec in multidrop fashion, he said.

Hyperchannel is a universal channel interconnect for host computers, storage subsystems and I/O subsystems, the spokesman stated. Implementation is accomplished using serial data transmission and buffering over a single coaxial cable.

It allows data channels to operate at their optimum rates, unlimited by the rates of attached devices, he said.

The Hyperbus costs about $5,000. The Hyperchannel costs $25,000 for each adapter, which includes 4K bytes of memory plus one trunk board.

Both units can be viewed at Booth 1178. Network Systems is at 6820 Shingle Creek Parkway, Brooklyn Center, Minn. 55430.

International Power

DALLAS – Three sizes of uninterruptible power systems will be shown by International Power Machines Corp. in Booths 1626 and 1628. The firm is based at 3328 Executive Blvd., Mesquite, Texas 75149.

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Improve your data line system and save money.

A customer of ours recently cut his current phone bill by 35% and upped his transmission capacity by 260%. He did it by replacing a portion of his dial-up system with a leased line and several of our inexpensive Frequency Division Multiplexers (FDMs).

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Our Money-Savers Information Packet includes an explanation of the ramifications of Bell's dial-up rate increases, several FDM case histories, a channel configurator chart to help you optimize your network, and an FDM data sheet.

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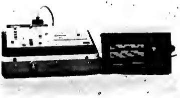
Prentice Corporation
795 San Antonio Road
Palo Alto, California 94303
415/494-7225
TWX 910 373 1239

Communications at NCC

Atlantic Research

DALLAS – Atlantic Research Corp.'s Booth's 1067 and 1069 will be dedicated to a display of the Intershake II data communication test unit and its companion Interview CRT unit. It will also include the Data Teeh 9600, the NCS-100 tech control system and the firm's data transmission patching equipment.

The Intershake II can handle codes and line disciplines at speeds up to 64 kbit/sec with internal clock and up to 256 kbit/sec-sec with external clock, the firm said. It provides for half- and full-duplex testing, including provisions for display and for calculating the block check character for transmit and receive data of bisynchronous and Synchronous Data Link Control among others.



Intershake/Interview

The Interview is used for displaying data communications transmissions and can provide the operator with a display of all data traffic or only traffic from a selected terminal or looation. The unit permits visual observation of up to 1K characters in either test, hex or octal for isolation of hardware or software faults in a communications system.

The Data Tech 9600 has the capability to exercise terminals, test modems and transmission facilities and to verify data character formats, the company said, while the NCS-100 network control system provides access at the interface points between the common carrier, modem and terminal equipment.

It gives the operator the chance to test individual lines and network modules for fault isolation, the firm added from 5390 Cherokee Ave., Alexandria, Va. 22314.

MI^2 Corp.

DALLAS – An acoustic coupler, data set and complete terminal system will be the featured attractions in Booth 1583 by MI^2 Corp. during next week's NCC.

The Design 76/4 coupler family contains four different models for applications up to 300 bit/sec. The coupler is available in originate-only models and originate and answer models. An option allows either model to be used as a direct-access data set. The units are priced at $310.

The Design 100 data set is for applications up to 300 bit/sec and is designed to interface terminals to the TWX data network and the DDD switched telephone network. Priced at $495, the unit is available in several control panel configurations.'

The Design 2400 KSR/T terminal is a 1,200 bit/sec switchable half- or full-duplex asynchronous printer terminal, according to the firm.

The programmable protocol interface board with the terminal incorporates an Intel 8080 microprocessor which can be programmed either in the factory or by the user for multiterminal demands.

The terminal sells for $3,595 from the firm at 1212 Kinnear Road, Columbus, Ohio 43212.

Design 100 Data Set

Digi-Log Systems

DALLAS — In Booths 1700 and 1701 Digi-Log Systems, Inc. will introduce a diagnostic tool that lets users monitor data lines in an unattended mode and store up to 1M characters, the firm said.

Priced at $3,500, the Tapetrap is an enhancement to the firm's DLM II data line monitor. The operator can set the monitor to record 250K characters and stop, record 1M characters and stop, or record continuously in an endless loop.

A trap sequence of up to 16 characters can be entered via an integral keyboard and the user programmed sequence can be used to either start tape recording or stop recording upon detection. In either case, special flags are placed on the tape at the point where the match took place. Digi-Log is at Babylon Road, Horsham, Pa. 19044.

Minis at NCC

Perkin-Elmer Data Systems

DALLAS – A total of 10 recently announced products can be seen for the first time at NCC when Perkin-Elmer Data Systems brings three of its divisions into one exhibit in Booth 1483.

Featured will be minicomputers from Interdata, disk and tape drives from Wangco and CRT and printer terminals from the Terminals Division.

Interdata will demonstrate the Model 5/16 for the first time. The single-board mini, to be shown here in a floppy disk configuration, features 16 general-purpose registers, direct addressing to 64K bytes of memory and vectored interrupts. The 256K-byte disk drive is the first floppy disk drive to be used by Interdata for its line of 16-bit minis.

In addition, Interdata will show an 8/16 system with 2.5M-byte disk and 30 char./sec printer; a 7/32 32-bit mini with 256K bytes of memory, two 300M-byte disk, two 75 in./sec, 1,600 bit/in. tape drives and a 600 line/min printer; and an 8/32 scientific system operating in Fortran VI with 500K bytes of memory and two 80M byte disk drives.

The Wangco unit will be displaying six products for the first time, including a 125 in./sec magnetic tape drive, the Model 14, which provides automatic loading and standard 800 or 1,600 bit/in. densities; an embedded formatter for tape drives with 800 or 1,600 bit/in. dual density; and the Model 82 microfloppy disk drive with up to 498.8K bytes of unformatted data capacity in its maximum single-drive configuration.

Other first time products include the Model 8200 microfloppy controller, which is an intelligent controller for the Model 82; the model 87 dual diskette drive system which comes in a standard package including two drives and controller formatter, although up to four drives can be daisy chained for 1M byte capacity; and a family of tape and disk controllers for the Digital Equipment Corp. PDP-11 and Data General Nova minis.

Additional Wangco products on exhibit include the Model 76 400K-byte standard floppy disk; the Super F, an IBM 2315-type front loading 10M-byte disk drive; and a range of tape drives from 37.5 in./sec to 75 in./sec.

The Terminals Division will be showing the Fox-1100 teletypewriter replacement, CRT terminal with a 9 by 12 dot matrix, 96-character Ascii set, 24-line by 80-character display and a built-in microprocessor.

Headquarters for Perkin-Elmer Data Systems is 106 Apple St., Tinton Falls, N.J. 07724.

Interdata Minis

Computer Automation

DALLAS – Computer Automation, Inc. will exhibit products from all of its divisions in Booth 1465.

From the Commercial Systems Division will come a display of the Syfa distributed data processing system; the Industrial Products Division will show automatic test and simulation systems; and the Naked Mini Division plans a display of OEM minicomputers.

The Syfa system will be demonstrated with a network of 10 to 15 terminals, the firm said, and peripherals including two 10M-byte disk drives and two printers.

The Capable 400 line of computer-controlled logic circuit board testers will highlight the Industrial Products Division display, including units capable of analog and hybrid circuit board testing as well as the parametric testing of digital circuitry.

Also on display will be the 4000 logic simulation systems, which support the Capable testers by generating diagnostic test programs for the particular circuit board based on data coded from the logic diagram of the board, the firm said from 18651 Von Karman, Irvine, Calif. 92713.

Centronics

DALLAS – Centronics Data Computer Corp. will show its 6000 Series printers in Booths 1238 and 1244.

The line consists of 75-, 150-, 300- and 600 line/min printers and joins the company's 100, 300 and 500 Series of serial dot matrix printers for minicomputer and remote batch terminals, as well as small and medium-sized business systems, the firm said from headquarters in Hudson, N.H. 03051.

CFI 3336 Series Disk Packs
Largest product in the line, in both size and storage capacity. First disk pack to use servo track control. Available in two versions. Model 1–100 megabytes, Model 11–200 megabytes. Configurations available for CDC, Honeywell, NCR, DEC and Data General, among others.

CFI 1316 Series Disk Packs
The beginning of the line. Proven and field-tested. Designed for use with IBM 2311, Singer System 10 and CDC equipment, among others.

CFI 2316 Series Disk Packs
[illegible] most versatile product in the line. Available in many [illegible] configurations, data [illegible] and track [illegible] [illegible]

Minis at NCC

Datapoint Corp.

DALLAS – Datapoint Corp. plans to use the NCC tto exhibit three new products from its location in Booth 1005.

The 6600 Advanced Business Processor has 120K of user memory, a 16-bit wide internal architecture and 600 nsec cycle speed. The unit is compatible with the rest of the firm's processors and offers multiply/divide and list handling instruction not available before, Datapoint claimed.

The 6600 comes with keyboard, video display and dual cassette tape decks and is designed for use with disk-based operating systems. Used as a host computer for the Datashare business time-sharing system, the unit can support up to 24 terminals.

Datapoint's DS41170 software, a diskette-based Datashare system, will also be demonstrated. DS41170 will support up to four ports on the Datapoint 1170 dispersed processor.

With DS41170, each user is allotted up to 4K of virtual memory for data area and 32K for program execution. Files are dynamically allocated among three diskette drives, with the fourth reserved for system files. Random-access, file-sequential and index-sequential access methods may be used in the creation and maintenance of these files.

The DS41170 interpreter will accommodate up to four user programs simultaneously, in any combination of local or remote functions. Real-time data communications may take place through one or more ports; batch data transmissions are possible with the utilization of Datapoint's batch emulator packages.

The Datapoint 1170 dispersed processor is equipped with a processor (5500-type) and user memory of 48K. It is available with two, three or four diskette drives.

The instruction set of the 1170 includes memory address indexing and basing capabilities, double-precision arithmetic, segmented and protected memory, 16 registers, multibyte I/O transfers and privileged instructions.

Datapoint is located at 9725 Datapoint Drive, San Antonio, Texas 78284.

Minicomputer Accessories

DALLAS – Minicomputer Accessories will occupy Booth 1818 with – what else? – a line of minicomputer accessories.

Included in the display by the firm, which sells most of its products by direct mail, will be such items as EIA extension cables that allow users to locate terminals further away from the mainframe; binders for keeping and storing floppy disks; file cabinets for floppies; and a specially designed stand to hold CRTs. Minicomputer Accessories is at 1015 Corporation Way, P.O. Box 10056, Palo Alto, Calif. 94303.

Kybe Corp.

DALLAS – Kybe Corp. will display its fully automatic SLT-80 computer tape cleaner/tester which opens the band, threads the tape and then cleans, tests and stacks it back onto the reel.

The system, which has a full cycle of 3-3/4 minutes, also reports the exact condition of the tapes, computer correlated at subcritical, nominal or hypercritical levels. It will be shown at Booths 1727 and 1729.

Three models are available for testing 9-channel formats at 1,600 bit/in., 6,250 bit/in. or both densities in combination. The SLT-80 is priced at $12,100 from Kybe at 132 Calvary St., Waltham, Mass. 012154.

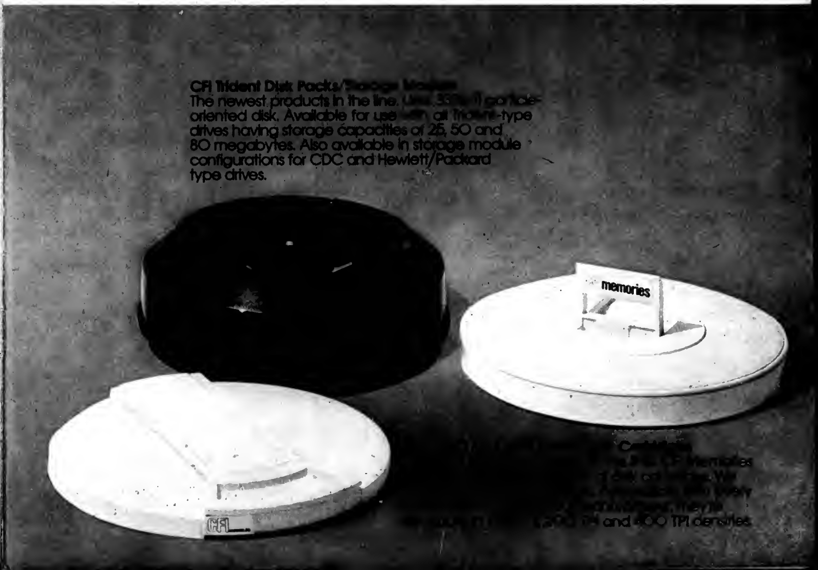
International Computer Products

DALLAS – The International Computer Products, Inc. ICP 700 minicomputer and the firm's TD-1 diskette unit will be the highlight of the exhibit in Booth 1511.

The standard ICP 700 will support up to 10 CRTs, four disk drives and four printers and has 10 multiprogramming partitions, according to the firm. The unit has 16K to 256K of main memory and can accommodate up to 80M bytes of disk.

The TD-1 microcomputer is intended as a peripheral accessory for either on-site or remote data terminals and is equipped with from one to four standard IBM-compatible diskette devices with a capacity of up to nearly 1M bytes of storage, the firm said. The unit can communicate at rates from 50 bit/sec to 19.2 kbit/sec and prices begin at $3,495. ICP is at 2925 Merrell Road, Dallas, Texas 75229.

TD-1 Micro



CFI Trident Disk Packs/[illegible]
The newest products in the line. [illegible]-oriented disk. Available for use [illegible] all [illegible]-type drives having storage capacities of 25, 50 and 80 megabytes. Also available in storage module configurations for CDC and Hewlett/Packard type drives.

[illegible] and 400 TPI densities

OEMs at NCC

Monolithic Systems

DALLAS – A range of microcomputer memories will be displayed in Booths 1240, 1242 and 1244 by Monolithic Systems Corp.

The exhibit will feature the MSC 4502, displayed for the first time, which is a compatible memory for the Intel SBC 80 family of single board computers and Intellec MDS systems. The use of 16-pin sockets allows the random-access memory (RAM) section of the unit to be expanded in 4K increments up to 16K. Four erasable programmable read-only memory (Eprom) sockets can be accommodated on the same board with a maximum storage of 8K.

The unit provides 16 switch-selectable address start, locations for RAM and 16 locations for Eprom. Distributed refresh time is 500 nsec on the system and read cycle time is 350 nsec, while write cycle time is 500 nsec. The unit is priced at $1,095 in single quantities.

The firm will also exhibit its line of DEC-compatible memories including add-on memories for the PDP-8, PDP-11 and LSI-11 computers as well as its Intel-compatible memories, the firm said from 14 Inverness Drive East, Englewood, Colo. 80110.

Vu-Data

DALLAS – Vu-Data Corp. will display its Model PS935/975 DMM-Counter-Mini-Scope in Booth 1624.

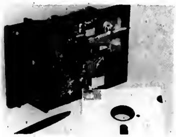
The test instrument has a dual trace scope; 50 MHz trigger range; 2 nsec sweep resolution; 35 MHz bandwidth and X-Y capability, the firm said from 7170 Convoy Court, San Diego, Calif. 92111.

BASF

DALLAS – BASF will show a mini floppy disk drive compatible with standard 5.25-in. flexible disk media in Booth 1795.

The Model 6106 is the first hardware product introduced in the U.S. by BASF.

The BASF 6106 is targeted for the OEM calculator, desk-top computer, terminal and word processing markets, the firm said.


Model 6106 Drive

Compact Size

The unit measures 5-3/4-in. in width, 3 in. in height and 7-1/2 in. in depth. It rotates mini diskettes at 300 revolution/min and records at 2,581 bit/in. on 35 tracks. The tracking density is 48 track/in. set up in up to 16 sectors. The unit allows up to 125K bits of data to be transferred per second at an average track-to-track access time of about 220 msec.

The 6106 drive consists of read/write and control electronics all contained on a printed circuit board, a drive mechanism, read/write head, a track positioning mechanism and the removable diskette, the firm said from Crosby Drive, Bedford, Mass. 01730.

Kennedy Co.

DALLAS – Booth 1785 will be used by Kennedy Co. to exhibit its Series 5300 disk drives, a line of fixed-cartridge, moving-head drives with a capacity of 70M bytes and a data rate of 1M byte/sec, according to the firm.

The unformatted capacities range from 14M bytes in the single-disk version up to the maximum 70M bytes in the three-disk model. Each surface has two 350 track/in. cylinders with a recording density of 6,000 bit/in. Track-to-track head motion is 10 msec and average head movement time is 45 msec with a worst-case maximum of 80 msec. Average latency is 10 msec and the unit uses a modified frequency modulation recording technique implemented with emitter-coupled logic.

The Series 5300 prices range from $2,500 to $4,000 from the company at 540 W. Woodbury Road, Altadena, Calif. 91001.

Qantex

DALLAS – Tape and cartridge drives and other equipment will be displayed by Qantex Division of North Atlantic Industries, Inc. in Booths 1842 and 1844.

The range of equipment includes the 200 minidrive for miniaturized cartridges with up to 330,000 bytes of storage and priced at $250; the 650 drive with a capacity of 2.5M bytes using the 3M DC300A cartridge and priced at $300 in OEM quantities; the 86008. Ansi tape formatter priced at $570; and the 2400 cartridge storage system with 23M bytes capacity and a price of $2,520. The firm is at 200 Terminal Drive, Plainview, N.Y. 11803.

CFI Data Module
The most technically [illegible] product in the line. First to in[illegible] and carriage into the module. Available in three models. Model 35–35 million bytes, Model 70–70 million bytes, Model 70F–70 million bytes with fixed heads for rapid paging.

[illegible] error-free. Compatible with IBM 3740 and other diskette drives.

CFI Abraxas V Digital Cassettes
A complete line of cassettes in various grades. Designed for use with most digital recording and word processing equipment.

CFI Abraxas Computer Tape
[illegible] for use at [illegible]

OEMs at NCC

Epic Data

DALLAS – Three programmable data collection terminals and two communications controllers will be available for inspection at Epic Data Corp.'s Booth 1057. The equipment is designed for use in factory data collection, inventory control and other similar applications.

The Model 1647-1 is an 8080 microprocessor-based terminal which electro-optically reads punched badges, displays times of day and provides five LED displays for prompting. The 1647-2 terminal additionally reads 80-column Ansi cards and includes 20 user-defined keys for inputting variable data. The 1647-3 provides 40 user-defined keys and 10 LED displays.

All the terminals may optionally receive data from magnetic striped badges and bar codes or directly from keystations. Other options include 10-digit numerical displays, 32-character alphanumeric displays, twisted pair line drivers, low-speed telephone system modem, serial asynchronous and synchronous communications ports and expandable read-only memories and randdm-access memories.

Control Unit

The Model 1648-1 control unit controls up to 30 terminals on one line, while the Model 1648-2 controls up to 100 terminals on four lines.

Prices for the equipment in quantities of 100 start at $995 for the 1647-1 terminal, $1,310 for the 1647-2, $1,455 for the 1647-3, $1,310 for the 1648-1 control unit and $1,615 for the 1648-2. Delivery is 45 days from the firm at 12728 15th Place N.E., Bellevue, Wash. 98005.

Interface Mechanisms

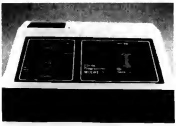
DALLAS – Bar code printers and readers will be shown in Booth 1845 by Interface Mechanisms, Inc.

The 8100 Series printers, which contain a microprocessor, are serial impact bar code printers designed for random input short runs. The Model 9210 features dual connectors to allow the unit to be attached in tandem with a CRT or on-line terminal; hand-held scanning from 3 in./sec to 50 in./sec; alphanumeric bar code reading, with variable messages up to 32 characters; half- or full-duplex operation; and RS-232 interface. The firm is at 5503 232nd St. S.W., Mountlake Terrace, Wash. 98043.

Data I/O

DALLAS – The Model 7 portable programmable read-only memory (Prom) programmer from Data I/O Corp. will be on display in Booths 1143 and 1145.

The unit is a universal Prom duplicator in its basic configuration, but with options is also capable of serial or parallel data communications in interchangeable data formats; remote control by teletypewriter, CRT terminal or computer; and emulation of over 200 Proms.



Model 7 Prom Programmer

It can be converted into a Model 9 programmer configuration, gaining hexadecimal keyboard, hex address and data displays, insert/delete data editing, error message readout and the ability to simultaneously access data from random-access memory (RAM), Prom and ROM emulators.

The 1K by 8-bit RAM with the basic unit is expandable in 1K increments, according to the firm at P.O. Box 308, 1297 N.W. Mall, Issaquah, Wash. 98027.

Wintek

DALLAS – Wintek Corp. will show its line of Wince Micro Module support hardware in Booth 1023, plus its Model B-R-B video terminal.

The support hardware includes such things as backplanes, card racks and power supplies, while the terminal has a 16 line by 80 character screen and operates in the scrolling mode. The characters are made up by a 5 by 7 dot matrix and the unit communicates in a bit serial asynchronous mode at standard speeds up to 9,600 bit/sec, the firm said from 902 N. Ninth St., Lafayette, Ind. 47904.

Rubber Urethanes

DALLAS – In Booth 2026 Rubber Urethanes Co. will show its line of rubber products, including capstans, feed rolls and drives for printers. The products are manufactured on a custom basis from customer blueprints, the firm said from 968 W. Foothill Blvd., P.O. Box 280, Azusa, Calif. 91702.

OEMs at NCC

General Robotics

DALLAS – Booth 2073 will be used by General Robotics Corp. to display a central processor based on the Digital Equipment Corp. LSI-11 microcomputer module, the firm said.

The OEM CPU includes both an LSI-11 double-sized backplane and a PDP-11 Unibus adapter so it can be used as a direct replacement for any LSI-11 or PDP-11/03, according to the firm, and for some PDP-11/04 and PDP-11/05 minis.

The standard GRC11/X3 includes an extended instruction set, floating-point arithmetic, 20K words, extended memory addressing to 512K words, a serial I/O module with switch-selectable data rates, a Unibus peripheral port and eight additional module slots, the firm said. It is priced at $5,995.

As a packaged system with dual-drive, double-density DMA floppy disk and operating system with Fortran IV, the GRC11/FDX3 costs $11,995, according to the firm from 57 N. Main St., Hartford, Wis. 53207.

Sheldon-Sodeco

DALLAS – Sheldon-Sodeco, a Landis & GYR company, will be displaying its series of 15-column impact printers in Booth 1128.

Capable of printing at speeds up to 3 line/sec for numeric or 1.5 line/sec for alphanumeric data, the PR1500 printers have a 54-character set and feature line feed up to 10 line/sec and can be purchased for $165 in single quantities, the firm said from 4 Westchester Plaza, Elmsford, N.Y. 10523.

PR1500 Impact Printer

EMM

DALLAS – Electronic Memories and Magnetics will make the first showing of its Severe Environment Controller System – 11, Industrial in Booth 1493.

The industrial minicomputer uses Mil grade TTL medium-scale integrated devices and has been programmed to be compatible with and to emulate the Digital Equipment Corp. PDP-11/34 or PDP-11/45, the firm said from 20630 Plummer St., Chatsworth, Calif. 91311.

Micon Industries

DALLAS – A computer terminal selling for $400 which is said to be "ideal for communicating with a microprocessor" will be displayed in Booth 1352 by Micon Industries.

The KDM/1 includes a full Ascii keyboard, 32-character alphanumeric LED display, AC power supply and RS-232 interface. Options include an acoustic coupler, mini-cassette tape unit and additional display capacity up to 1,920 characters.

The terminal operates at rates of up to 9,600 bit/sec.

Micon is located at 252 Oak St., Oakland, Calif. 94607.

Mag-Tek

DALLAS – Mag-Tek, Inc. will use Booth 1719 to show its line of magnetic stripe reading and encoding equipment for point-of-sale, factory data collection, automatic gas dispensing and access control systems.

The single unit price of the systems begins at $140, according to Mag-Tek at 20725 S. Annalee Ave., Carson, Calif. 90746.

Lipps

DALLAS – A 20-track, 1/2-in. digital read/write head, which costs about $350, will be one of a whole line of digital magnetic recording heads shown by Lipps, Inc. in Booth 1668. These heads feature an increased number of tracks per given tape width, the firm noted. Lipps is at 1630 Euclid St., Santa Monica, Calif. 90404.

Mag-Tek Reader

We take your business personally

We have made a major commitment to R&D and to the continuous refinement of the manufacturing process. We will continue to develop technologically advanced products for both the end-user and OEM.

We have also made a major commitment to a nationwide network of independent representatives. The men who sell and service our line have proven themselves to be the best in their field. That's why they represent CFI. They work hard to earn your business by giving you the kind of personal attention and professional service you just can't get any place else.

A nearby CFI representative is waiting to show you how you can get all the care and quality we put into our products and all the personal attention you could ever want at prices your accountant will appreciate. And that's really the bottom line.

Call us toll-free for the name of your local representative: 800/854-3290. Or write: CFI Memories, Inc., 305 Crescent Way, Anaheim, CA 92801.

CFI memories, inc.

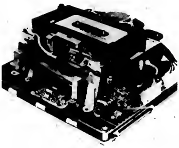
OEMs at NCC

Triple I

DALLAS – The STR-150 tape drive system providing remote signal control of transport functions will be shown in Booth 2015 by Triple I, Inc., which will also display a cassette transport evaluation package.

The STR-150 includes read/write electronics, control and timing logic and motor control logic and is designed for mini and microcomputer systems, the firm said. It accepts any asynchronous 8-bit parallel data word and records in a self-clocked serial mode.

The Phi-Deck cassette transport evaluation packages provide building blocks for digital or analog cassette systems and include a Phi-Deck transport, motion control board, remote control box, power supply, connecting hardware and various sensing and status options. Triple I is located at 4605 N. Stiles, Oklahoma City, Okla. 73118.



STR-150 Tape Drive

Innovative Electronic Systems

DALLAS – The C-40 from Innovative Electronic Systems is an interface conversion board that converts the Teletype Model 40 SSI interface to that of a Centronics Corp. printer and will be displayed in Booth 1781. The unit mounts inside the Model 40 cabinet underneath the printer mechanism and costs $795 in single quantities, the firm said from 5951 N.W. 151 St., Miami Lakes, Fla. 33014.

GNT Automatic

DALLAS – GNT Automatic, Inc. will introduce its Model 27 1,500 char./sec paper tape reader spooler. Also on display in Booth 1176 will be GNT's line of paper tape punches and associated interfaces. The Model 27 is priced at $1,495 from the firm at 440 Totten Pond Road, Waltham, Mass. 02154.

Okidata Corp.

DALLAS – Okidata Corp. will use Booth 1533 to show a family of disk drives that provides up to 74M bytes of memory in a 7-in. rack with prices beginning at $46 per 1M bytes.

The 3300 Series comprises six models of moving-head, fixed-disk drives which range in capacity from 12.4M to 74.4M bytes. Two models of fixed-head-only provide capacities of 2.97M and 5.94M bytes. Fixed heads can also be added to moving-head models to a maximum of 2.2M bytes. The fixed heads have an average access time of 10.1 msec and can be accessed while positioning the moving heads.

Drive Feature

The drives feature a rotary positioner, IBM 3340 Winchester-type heads and media.

Features of the Okidata 3300 disk drive family include a rotary positioner with a 10 msec track-to-track seek and 38 msec average access time, a 7.33M-byte data transfer rate, 18,560 byte/track, two moving heads per disk surface and 339 addressable cylinders.

Okidata is located at 111 Gaither Drive, Mt. Laurel, N.J. 08054.

Magnusonic Devices

DALLAS – Magnusonic Devices, Inc. will fill Booth 1725 with magnetic tape and disk heads.

The firm will feature IBM-compatible 7- and 9-track heads; magnetic disk heads, including 2314-type (100 track/in. and 200 track/in., 2,200 bit/in. and 4,400 bit/in.) and 3330-type with 192 track/in. and 370 track/in.; and Winchester-type heads.

In addition, floppy disk heads and cassette and cartridge heads will be displayed by Magnusonic Devices, located at 290 Duffy Ave., Hicksville, N.Y. 11801.

Nortronics

DALLAS – Nortronics Co., Inc. will display its line of magnetic heads in Booth 1266. The line includes 1/2-in. 6,250 bit/in. heads capable of 75 in./sec to 200 in./sec; .15 in. cassette heads; floppy disk heads with IBM compatibility; magnetic credit card heads; ledger card and merchandise tag heads; and thrift and passbook heads.

Nortronics is located at 8101 Tenth Ave. N., Minneapolis, Minn. 55427.

Your line.

800/854-3290

(In California 714/776-8571)

Rep Inquiries Invited
See us at our Dallas hospitality suite.

CFI memories, inc.

Peripherals at NCC

T-Bar, Inc.

DALLAS – T-Bar, Inc.'s line of peripheral switching equipment for both mainframes and minicomputers will occupy Booths 1811, 1813 and 1815.

Each switcher is compatible with a specific computer, but they share certain common features such as the capability to switch peripherals to reconfigure systems, the firm said. All of the units are suitable for remote control, T-Bar added from 141 Danbury Road, Wilton, Conn. 06897.

California Computer Products

DALLAS – An interactive graphics terminal, an on-line plotter controller and a quad-density floppy disk drive head the list of new products to be shown in Booth 1233 by California Computer Products, Inc.

The terminal will be demonstrated in its basic configuration which consists of a processor, display screen, RS-232C interface and Ascii keyboard. Supporting software will also be demonstrated.

The on-line plotter controller, designed as an intelligent interface between specified Calcomp plotters and a wide spectrum of computers and calculators, is adaptable to either local or remote operations, Calcomp noted.

The controller can convert computer output in both serial and parallel formats, with an undedicated parallel input port available for specialized inputs.

Also to be shown will be a new expanded capabillty, off-line controller, the Model 921.

Among floppy disk products exhibited will be a Model 143M two-sided, double-density multifunction drive and a Model 1143 floppy disk controller.

With an unformatted capacity of 12.8M bits, the 143M has a flat head design for ruggedness, compactness and durability, the company said.

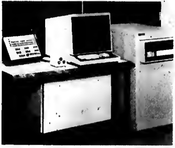
For direct memory access or RS-232 interface, the 1143M floppy disk controller can be used to control as many as four 143M drives, containing up to 16.4M bits of IBM 3740/3600 compatibly formatted data.

In large disk memory products, the company's exhibit will include the entire Calcomp line of Trident disk drives, in unit capacities from 25M bytes to 300M bytes, the firm said from 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Imlac Corp.

DALLAS – Imlac Corp. will show its PDS-1G and PDS-4 interactive graphic display systems in Booth 1581.

The programmable minicomputer systems can operate either as remote terminals or as free-standing graphics systems and include a CRT monitor, keyboard, serial asynchronous interface and 16-bit word main memory shared by the mini and the display processors, the firm said.



Imlac PDS-4

Options to be shown include light pens, data tablets, joy sticks, color monitors, graphic hard-copy devices and both removable cartridge-type and floppy disk systems. Prices start at $18,000 and delivery is 90 days from the firm at 150 A St., Needham Heights, Mass. 02194.

Summagraphics

DALLAS – Summagraphics Corp., a supplier of data tablets and digitizers, will unveil a programmable microprocessor-based digitizer, which allows the user to preprocess data. This digitizer, on display at Booth 1170, features an 8080 microprocessor, plus custom firmware such as relocatable origin, binary/BCD conversion, metric output, incremental operation, scaling, rotational correction, area calculation, distance measurement and angle calculation.

Program call-up and parameter entry are accomplished by touching a hand-held stylus or cursor to a programmed menu pad on the digitizer itself. In addition, a system display panel exhibits X-Y values, computational results and current operating mode.

The unit ranges in price from $2,400 to $6,000. Summagraphics is located at 35 Brentwood Ave., Box 781, Fairfield, Conn. 06430.

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	TLMS Release 4	Other
On-line updating and inquiry	Yes	
Alternate logging capability	Yes	
Protection of scratch and non-scratch status	Yes	
Audit and inventory reports	Yes	
Console sharing for multiple CPU's	Yes	
Automatic scratching of tapes	Yes	
Simple interface to OS	Yes	
Scheduling and control of tapes being moved to off-site location	Yes	
Automatic uncataloging of scratch tapes	Yes	
Non-quiesing of tape jobs while backing up the master	Yes	
Unchanged JCL for users	Yes	
Non-degradation of system performance	Yes	

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Peripherals at NCC

Key Tronic Corp.

DALLAS – Key Tronic Corp. will introduce its Datareader, described as a low-cost OCR system, in Booths 1354 and 1356. Designed for use with the Key Tronic M9 electronics module, the Datareader uses a microprocessor for multi-font character recognition.

One feature is a high-level character resolution, which refers to the grade print quality as defined by the Ansi code standards, Key Tronic said. As a further enhancement, the company added, the sensitivity adjustments that are located on the front panel allow the operator to fine tune or even detune the recognition circuits, thereby expanding the range of character recognition.

The read heads in the Datareader have a vertical adjustment to accommodate a variation in form sizes ranging from a minimum of 1 in. in height by 2-1/2 in. in length to a maximum of 6 in. in height by 8-3/4 in. in length.

The unit can read and process up to 3,900 document/hour in a variety of fonts including OCR-A numeric, OCR-A alphanumeric, Farrington 7B, Farrington 12F, Micr print, handprint, OCR-B, 407, 1428 and a variety of subsets in the OCR-A numeric, OCR-B and handprint selections, the firm said.

In addition, the auto feed mechanism has an adjustment for document thickness to ensure single document selection and a document thickness control knob located on the front of the unit allows the operator to set up the feeder mechanism for the particular weight of document being processed. The multi-document detector shuts down the transport automatically if the document thickness control has not been set correctly.

Additional Features

Other features, such as a singular dual-line read which is standard with each transport, allows two lines of data to be read by attaching a second transport mechanism. Dual read heads can be handled by a single M9 electronics module. Selective data fields under control from the M9 electronics read head will recognize or ignore selected blocks of data in the scan path, the company said.

Prices range from $19,000 to $30,000, depending upon configuration, interface and fonts required. Key Tronic is in Building 14, Spokane Industrial Park, Spokane, Wash. 99216.

Texas Digital Systems

DALLAS – Booth 2075 will be the place Texas Digital Systems, Inc. will show a new model in its line of tape message display systems.

The units provide a message display at each tape drive, disk drive or printer to tell operators which tapes or disks need to be mounted or dismounted at any time.

The units feature up to 256 individually addressable displays; local and remote operation; a top-mounted signal light that flashes to indicate the need for operator intervention; a 64-character alphanumeric character set for volume serial numbers, data set names and special messages; and Display Support System software for IBM users.

The unit operates through the communications control unit as a standard peripheral and can operate with shared drives and multiple CPUs, the firm said. The software is said to operate with all major IBM operating systems, establishing communication linkages and automatically displaying mount, dismount and status messages.

Previously the system was available with a 16-character display and the new model will have a 20-character plasma display.

Texas Digital can be reached at P.O. box 3701, Bryan, Texas 77801.

MDB Systems

DALLAS – Booth 1081 will be the showcase for MDB Systems, Inc.'s set of line printer controllers.

The highlight of the exhibit will be the latest addition to the MDB line, the HP 2100 controller designed to interface Hewlett-Packard's HP 2100 to most printer models of Centronics, Data Products, Data 100 and Data Printer, as well as the Digital Equipment LA180. Line printers such as Printonix, Tally, Diablo 2300 and others which emulate the Centronics or Data Products printers are also compatible with the MDB controller.

Transparent to Host

Transparent to the host computer, the controller is a single printed circuit board requiring one slot in the HP chassis; a 15-foot cable is supplied.

Prices for the controller range from $850 to $1,250, depending on the line printer model selected.

Other MDB controllers for the same selection of printers are available for the DEC PDP-11 and PDP-8, DEC LSI-11 microcomputer, Data General Nova and Interdata computers.

MDB Systems is located at 1995 N. Batavia St., Orange, Calif. 92665.

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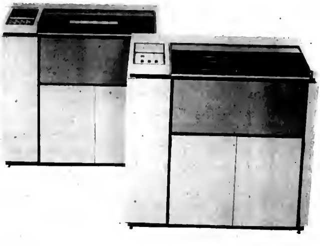
So, if you're considering a new system, or a replacement give us a call – San Francisco: (415) 326-2115, in Los Angeles: (213) 887-5240. Manufacturers Representatives Inquiries Invited.



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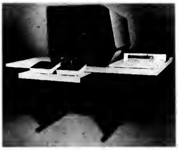
Peripherals at NCC

Vector General

DALLAS – Vector General will show its 3300 series of interactive graphics displays in Booth 1115. The units are capable of providing refresh graphics for minicomputers with standard I/O configurations at writing speeds up to 16,667 short vectors and 6,000 characters.

Two models of these direct writing displays are offered: Model 3301, which displays two-dimensional graphics and alphanumerics and the Model 3302, which adds image transformation and rotation capabilities to the basic 3301.

These microprogrammed units feature 2D digital transformations, variable-speed vector and font generators, programmable graphic instructions, font transformations, optional refresh buffer and subroutine stack capability.



Series 3300

The 3300 models contain a microprocessor display I/O control unit which accepts 16-bit data and controls and front ends the display generation hardware. This unit is oriented to list interpretation, using either the host minicomputer or optional internal buffer for image refresh.

Other hardware features include 256 programmable intensity levels, four vector modes, six line textures, hardware blinking and 4K by 4K addressable locations.

Input devices include data tablet, alphanumeric keyboards, joystick, 16 or 32 function switches, control dials and light pen.

Vector General at 21300 Oxnard St., Woodland Hills, Calif. 91364.

Diva, Inc.

DALLAS – Diva, Inc. will show its DD-40 and DD-50 series of disk systems for a range of minicomputers at Booth 2012.

The DD-40 systems come in versions for the Digital Equipment Corp. PDP-11, Interdata and Data General minicomputers. Each contains between 100M- and 300M bytes with a transfer rate of 806- to 1,209 kbyte/-sec and an average access time of 10 msec track-to-track.

The comptroller V controller provides error correction and microprocessor technology; it can connect up to eight spindles.

The DD-50 also uses that controller and is available for DEC, DG and Interdata machines in 25.7M-, 54.7M- and 82.1M-byte capacities unformatted, the firm said from 607 Industrial Way West, Eatontown, N.J. 07724.

Sykes Datatronics

DALLAS – The Comm-Stor communications diskette unit will be highlighted at Booths 1722, 1724 and 1726 by Sykes Datatronics, Inc.

The unit, featuring an RS-232-compatible interface, can be connected to any asynchronous terminal, printer or modem, the firm said, adding the unit is built around a microprocessor that uses a message-oriented directory for storing and retrieving data.

Comm-Stor will also handle the label and data conversions (Ascii to Ebcdic) required to prepare IBM 3740-compatible diskettes on an Ascii terminal.

The device can operate at speeds up to 9,600 bit/sec. Prices start at about $1,500 for a single-drive unit and at about $2,100 for a dual-drive unit, the firm said from 375 Orchard St., Rochester, N.Y. 14606.

EMM

DALLAS – Add-on memories for the IBM 370/158 and 168 will be spotlighted in Booth 1493 by Electronic Memories & Magnetics Corp.

The units feature Standby Memory and include 64K bytes (in four 16K-byte segments) of semiconductor memory and main storage protection when double bit errors occur in one of four locations, the firm said. In addition, the units feature deferred maintenance capability that allows the operator to either automatically replace or reconfigure any failed segment of memory by a single switch setting, the company added from 3216 W. El Segundo Blvd., Hawthorne, Calif. 90250.

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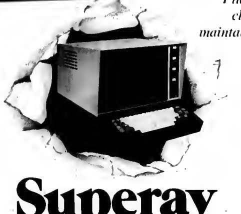

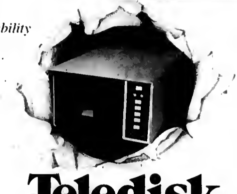

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Peripherals at NCC

Tab Products Co.

DALLAS – Booths 1222, 1224, 1226 and 1228 will be the home for a display of the Model 501 card-oriented terminal and the diskette-based System 700 from Tab Products Co.

The 501 punches, prints, interprets, verifies and corrects, the firm said, noting it is microprocessor-controlled and has a buffered memory.

Includes Micro

Built around a microprocessor, the System 700 combines IBM 3740 compatibility with a variety of configurations from a single-station model to a dual-station model and such options as a card I/O terminal and line printer.

The firm will also display its accessory products including the Dataguard safe for storing magnetic media, the Hang II tape storage system, the Data Media storage system for tapes and the line of CRT display desks, the firm said from 2690 Hanover St., Palo Alto, Calif. 94304.

Gould, Inc.

DALLAS – Gould Inc.'s Instrument Systems Division will show a remote graphics processor (RGP) that gives remote terminals the capability of generating graphic hard copy when coupled with a Gould 5000 Series electrostatic printer/-plotter.

With either a remote job entry or batch type terminal, the Gould processor – shown in Booth 1015 – prints charts, graphs and engineering drawings at paper speeds averaging 1/2-in./sec, when the serial data rate is 9,600 bit/sec. Actual paper speed varies from .04- to 1 in./sec, depending on the plotter model, the rate at which data is received and the plot.

Using Gould's Plot graphics software and RGP option software on the host computer, input data is processed and transmitted over the communication line in an encoded character form. The RGP data can, therefore, be handled by standard host computer spooling software without modification, the firm said.

Using an RS-232C interface connection to the terminal, the RGP processes the transmitted graphic data and sends raster data to the Gould plotter.

Software is available for host computers of the following types: IBM 360/370, Univac 1100 Series and Confrol Data Corp. 6000, 7000 or Cyber 70 Series.

An optional hardware character generator is available to provide alphanumeric printer/plotter output for most terminal configurations using Ascii format, Gould said from 3631 Perkins Ave., Cleveland, Ohio 44114.

Information Terminals Corp.

DALLAS – Information Terminals Corp. (ITC) will bring its entire line of removable magnetic storage devices, featuring the Verbatim recording media.

Verbatim is a formulation of ferric oxides in macromolecular binder system that adheres it to the tough polyester film, a spokesman explained. It is used on ITC's floppy disks, magnetic cards, digital tape cassettes and 1/4-in. cartridges.

The Verbatim media is also used on ITC's MD 525, a flexible minidisk which is about half the size of a standard floppy disk and provides one-third the storage capacity. It is priced at $5.25.

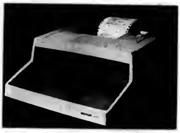
All Verbatim devices are guaranfeed error-free and can be seen in Booths 1032 and 1034. ITC is located at 323 Soquel Way, P.O. Box 9077, Sunnyvale, Calif. 94086.

Victor Comptometer

DALLAS – Victor Comptometer Corp. will be showing its stand-alone 5000 Series of alphanumeric printers for label and ticket printing in Booths 1771, 1773, 1775 and 1777.

Each unit is equipped with a microprocessor controller and a double line buffer for incoming data leading to a data rate of up to 9,600 bit/sec. The Ascii inputs are parallel for the Model 5012-463, RS-232 for the Model 5011-463 and current loop for the Model 5012-463.

The company is at 3900 N. Rockwell St., Chicago, Ill. 60018.



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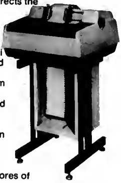

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Peripherals at NCC

Tally Corp.

DALLAS – Booth 1283 will be the site for a display of a family of matrix line printers with speeds of 375- and 500 line/min from Tally Corp.

The T-5000 series features a 9 by 7 half-space matrix font, full-line buffering, a 64-character set, 11 in./sec slew speed, scroll ribbon, 132 printer positions at 10 char./in., 6 line/in. spacing, dual adjustable tractors and 0 to 99 line forms length, the firm said.

The units use the helix printing principle with 22 voice coil activated hammers and all printer functions are controlled by an integral microprocessor.

Interface Controlled

The unit also offers a selection of interface controllers for various minicomputer and for emulation of other printers. Options include a 9 by 9 half-space font, double 96-character set, compressed printing, self-test, 8-channel tape and 6- or 8 line/in. spacing, plus special character sets. Prices for the system start at $6,950, the firm said from 8301 S. 180th St., Kent, Wash. 98031.

Applicon

DALLAS – A system for producing color hard copies based on a three-color ink jet plotter will be demonstrated in Booth 2042 by Applicon, Inc.

The color plotter uses three ink jets in the primary colors (red, yellow, blue) to print on paper, overhead transparency film and other media, the firm said.

The minimum time for a full-size (22 in. by 34 in.) plot is 8-1/2 min, the company said, adding that the resolution is 5 point/mm or 127 point/in.

15,000 Shades

Over 15,000 color shades are provided under software control, and the unit has a set of Fortran subroutines for making charts and maps as well as handling direct input from raster scanners.

The basic unit is priced at $39,500. Applicon is at 154 Middlesex Turnpike, Burlington, Mass. 01803.

Randomex

DALLAS – Users are invited to bring problem disk packs to Booth 1805 to try out the Model 435 disk cleaner made by Randomex, Inc.

The cleaner is automatic and can clean the IBM 1316, 2316, 3336-1 and 3336-11; the Univac 8440, 8416 and 8418; the Calcomp Trident line; the Burroughs B-206 pack; and the Control Data Corp. 9876 and 9877 data storage modules. It is priced at $4,495 from the firm at 27303 Warrior Drive, Rancho Palos Verdes, Calif. 90274.

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Axiom Corp.

DALLAS – A compact line printer that operates at 160 char./sec and is priced at $655 will be shown in Booth 104 in the Personal Computing Section.

The stand-alone printer includes a case, power supply, Ascii interface, character generator and paper roll holder. An RS-232 interface, with a switch to provide compatibility with Centronics or Tally input connectors, is available for $85.

The unit has a microprocessor controller and prints on 5-in. wide electrosensitive paper with the print formed by passing a high current for 1 µsec from the print head to the paper, the firm said from 5932 San Femando Road, Glendale, Calif. 91202.

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COMPUTER MANAGEMENT
UNITED KINGDOM
World rank as DP market: *Fourth*
1975 DP expenditures: *$2.7 Billion*
1975 imports from US: *$270 Million*
Rank as importer from US: *Third*
Computer Management is a monthly magazine recently purchased by *Computerworld, Inc.* Monthly circulation is 30,000.

COMPUTERWOCHE
GERMANY
World rank as DP market: *Third*
1975 DP expenditures: *$3.7 Billion*
1975 imports from US: *$274 Million*
Rank as importer from US: *Second*
Computerwoche is a weekly tabloid newspaper started by *Computerworld, Inc.* It has a circulation of 21,000 to the West German computer community.

SHUKAN COMPUTER
JAPAN
World rank as DP market: *Second*
1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*
Shukan is a weekly tabloid newspaper, jointly owned by *Computerworld* and Dempa publications. Circulation is 35,000.

ZERO-UN INFORMATIQUE
FRANCE
World rank as DP market: *Fifth*
1975 DP expenditures: *$2.5 Billion*
1975 imports from US: *$223 Million*
Rank as importer from US: *Fourth*
Computerworld represents Zero-Un Informatique in the US. Zero-Un has three publications, one a weekly tabloid newspaper with circulation of 22,000; the second a monthly magazine, circulating 13,000 copies; and a new bi-weekly, Minis and Micros. All circulate throughuut Europe's French speaking computer market.

DATANEWS
BRAZIL
World rank as DP market: *12th*
1975 DP expenditures: *$250 Million*
1975 imports from US: *$60 Million*
Rank as importer from US: *(Est) 10th*
DataNews is a bi-weekly tabloid newspaper in Portuguese with an English-language summary. It is owned by *Computerworld, Inc.* and has a circulation of 7,000.

Computerworld now has sister publications in five leading international markets for US computers and computer-related equipment. These markets import in excess of a billion dollars of US-made computer products. The publications are operated and edited by local experts, and published in the language of the computer people they serve. And they do an excellent job of covering their markets.
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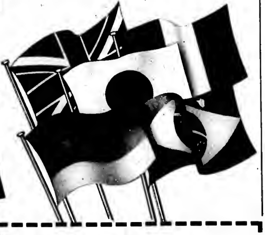

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Software at NCC

1st Datasystems

DALLAS – A Cobol compiler that runs under Data General's AOS operating system will be announced by 1st Datasystems, a division of Data Communications Corp., in Booth 1744.

The compiler is said to implement an extended subset of Ansi 1968 Cobol and offers sequential, random and Isam disk files with up to 32M bytes per disk file. It also offers Ansi editing capability, subscripts to three levels and permits up to 30 characters in data names, as well as featuring block tape I/O and the ability to call Assembly language subroutines, the firm said.

It is compatible with the entire Data General line from the Micronova through the Eclipse C330 and with any of the disk or diskette operating systems. It also provides programming aids including cross-reference source listing, 100 diagnostic messages, a variety of file utilities and a five-key sort program, the firm said.

It will be shown in connection with the company's Unique distributed processing system and the firm's Unique remote terminal system and will be connected on-line to a Burroughs B6700. The division is located at 2985 Vanguard Drive, Memphis, Tenn. 38131.

Cullinane

DALLAS – Cullinane Corp. will use Booth 1553 to highlight the features of its data base management system.

Modules of the system will include the Integrated Database Management System, the Integrated Data Dictionary, the On-Line Query Facility, the Culprit output processor, the IDMS-11 data base management system for the DEC PDP-11 and the back-end data base management system. The firm is at 20 William St., Wellesley, Mass. 02181.

MSA

DALLAS – Management Science America, Inc. (MSA) will show its line of financial software in Booths 1071 and 1073.

The line includes payroll, general ledger and financial reporting, fixed assets, accounts payable, accounts receivable, supplies inventory control and purchasing, and personnel management and reporting software. MSA's general ledger has 450 users and its payroll system has 600, the firm said from 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

MRI Systems

DALLAS – MRI Systems Corp.'s System 2000 data base management system and the firm's Control 2000 data dictionary will be the featured products in Booths 1612 and 1614.

The System 2000 interfaces to Cobol, Fortran, Assembler and PL/1 and includes integrated report writer and multiuser/multithread capabilities. The Control 2000 accumulates information about data fields and records, schemas, reports, programs and data base definitions.

The System 2000 costs between $30,000 and $100,000, depending on options, and the Control 2000 costs $15,000. MRI can be reached at P.O. Box 9968, 12675 Research Blvd., Austin, Texas 78766.

Incoterm

DALLAS – In Booths 1870 and 1872, Incoterm Corp. will demonstrate two data entry systems: Data Entry Level II and Local Forms Control. These systems will be operating on the firm's SPD 20 family of intelligent terminals.

Data Entry Level II is a general-purpose package for data entry, forms creation, editing and transmission applications, while the Local Forms Control (LFC) system is designed to emulate IBM 3270 terminals. The LFC system permits diskette storage at the local site providing the ability to store both forms and input data locally, the firm said from 65 Walnut St., Wellesley Hills, Mass. 02181.

NTIS

DALLAS – The National Technical Information Service (NTIS) of the U.S. Department of Commerce will use Booths 1878 and 1880 to "inform the DP community that there exists a federal government agency where a member of the public can go to obtain a computer program, data file or any of hundreds of thousands of information products that the government has produced and paid for with taxpayer money."

The display will include copies and descriptions of these products as well as an on-line terminal to the agency's bibliographic data base, the agency said, noting the average price for these products is about $200. NTIS is at 5285 Port Royal Road, Springfield, Va. 22161.

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Terminals at NCC

Panasonic

DALLAS – Panasonic plans to introduce a multipoint line data entry terminal at Booths 1044 and 1046.

The unit, called the Data Action Tracker, and its associated EIA RS-232C system interface unit were designed to accept punched badges or cards and include 25 options.

The unit can be desk- or wall-mounted, the firm said from 1 Panasonic Way, Secaucus, N.J. 07094.

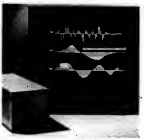
Ann Arbor Terminals

DALLAS – Ann Arbor Terminals, Inc. will have a first at NCC with Booth 1584, staffed entirely by women since there are no men in the firm's marketing department.

In addition, the firm will be introducing the Model 400 CRT display that is teletypewriter-compatible and has scrollable memory.

Another new product is a rack-mountable CRT controller package, the firm said, but did not release further details on the two products.

The firm will also show the graphics option for its line of 2480 terminals and a switchable interface option for the unit. The basic terminal displays 24 lines of 80 characters as well as graphics symbols.



Model 400

Characters are 64-character Ascii display in a 5 by 7 dot matrix. Prices begin at $1,395 for the controller only or $2,045 for the complete Design III terminal.

The switchable interface option provides for selection of either RS-232 or 20 MA current-loop interface.

The firm is headquartered at 6107 Jackson Road, Ann Arbor, Mich. 48103.

Telex

DALLAS – The Terminal Communications Division of Telex Computer Products, Inc. will display its TC 270 series of terminals that are compatible with IBM 3270 software controls and hardware attachments in Booth 1087.

The TC 270 terminals are directly attachable to IBM 3272 local and 3271 remote control units; they can also be attached through the Telex TC 271 or TC 272 controllers to replace the comparable IBM units.

The TC 271 can operate at 2,400-, 4,800-, 7,200- or 9,600 bit/sec and handle IBM terminals and printers as well as those from Telex.

The display is available in both stand-alone (TC 275) and cluster (TC 277) versions. Both come in Model I (480-character screen) and Model 2 (1,920-character screen) configurations.

Unlike their IBM counterparts, the Model 1 versions can be upgraded in the field to Model 2 versions, Telex claimed.

Also on exhibit will be the TC 284 and 234 printers which use the Diablo Hytype I impact print mechanism. The units operate at speeds from 30- to 254 char./sec depending on the application, the firm said from 3301 Terminal Drive, Raleigh, N.C. 27604.

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Hardware Index Registers	15	2	8
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Directly Addressable Memory(KB)	64	2	56
Automatic Interrupt Vectoring	Standard	N/A	Standard
Parity	Optional	Optional	N/A
Cycle Time (nanoseconds)	600	800	725
PRICE	**6/16**	**NOVA 3/4**	**PDP-11/04**
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See CS/40 operating at NCC booth #1215 June 13–17, Dallas.

Terminals at NCC

Western Union Data Services

DALLAS – A teleprinter offering 120 char./sec throughput with keyboard entry will be shown in Booth 2008 by Western Union (WU) Data Services.

The EDT 1232 keyboard send/receive (KSR) unit has a 1K-character buffer and permits 132 print positions per line. A heavy-duty print mechanism utilizing the belt printer concept with font individual character "fingers" is used.

The teleprinter has a standard Ansi four-row keyboard capable of generating 128 Ascii characters, including lower- and upper-case characters. Control functions are clustered in the left corner of the keyboard; in the right corner is a numeric cluster.

The terminal transmits and receives data at 10-, 30- and 120 char./sec, switch selectable, in serial form. It operates in an attended or unattended mode over the dial-up network.

Other features include form feed at the rate of 8 in./sec; vertical tabulation; and horizontal tabulation to any character position across the width of a print line.

The unit is equipped with an RS-232 interface with customer-provided equipment. For systems operating in half-duplex, an optional feature provides an interface into a Bell 202-type data set to allow for line turnaround on specific Ascii characters and reverse channel operation.

Options include parity error detection with alarm and character substitution; manual and automatic 20-character answerback; and current-loop interface of 20- or 60 mA.

Prices for the EDT 1232 KSR including maintenance start at $150/mo on a three-year lease, the firm said from One Lake St., Upper Saddle River, N.J. 07458.

EDT 1232

Datamedia Corp.

DALLAS – Datamedia Corp. plans to put six terminals on display at Booths 1012 and 1014.

The Elite 1500A alphanumeric terminal is compatible with Teletype models 33 and 35 when the RS-232C interface is used. The unit, priced at $1,250, operates only in the roll mode; all data enters on the bottom line of the display on a character-by-character basis.

The memory is modular, providing display capacities from 256- to 1,920 characters, the firm said, and the data rate is switchable between any two speeds in the 50- to 4,800 bit/sec asynchronous range.

The Elite 1520A is an unbuffered Teletype-compatible unit that displays 1,920 characters in a 24-line by 80-character format with a 64-character Ascii set. The full 128-character upper and lower case Ascii set and APL/Ascii switch-selectable capabilities are available optionally. Basic models start at $1,555.

Portable Versions Available

The two units also come in portable versions.

The Elite 4000A to be exhibited is a programmer terminal system with an 8-bit word length. It features a block-oriented display organization, interrupt-driven vectored I/O, expandable display memory to 32K and stored memory tag bits, the firm said from 7300 N. Crescent Blvd., Pennsauken, N.J. 08110.

Extel

DALLAS – The featured product at Extel Corp.'s Booths 1654, 1656, 1658 and 1660 will be the Series B teleprinters, a microprocessor-based line of programmable terminals.

The unit speeds vary from 15 char./sec to 30 char./sec on Telex or private-line terminals. The basic modular hardware can be configured as receive-only (RO), keyboard send/receive (KSR) or automatic send/receive (ASR), 5- or 8-level, with a range of interfaces and codes.

Memory is available in 4K or 8K sizes to either augment or replace the paper tape feature, Extel said.

Monthly rentals for the Series B range from $70 to $185 for a one-year term. Extel is at 310 Anthony Trail, Northbrook, Ill. 60062.

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Terminals at NCC

Ontel Corp.

DALLAS – Ontel Corp.'s OP-1 programmable terminal will be at work in Booth 1197 performing applications ranging from word processing through terminal emulation to data entry.

The firm will also show a disk operating system with up to 40M bytes of storage and two higher level languages – Basic and a Cobol-type language called Sacbol – as well as Assembler.

The OP-1 includes a microprocessor and is priced at $2,285 with 4K words of memory. It contains a display, keyboard, terminal logic, memory and room for five I/O controllers.

The terminal logic consists of three microprocessors dedicated respectively to CPU functions, I/O functions and display functions.

In addition, it has a 256- or 512-byte bootstrap loader. Controllers for disk; diskette; printers; asynchronous, bisynchronous and synchronous communications interfaces can be attached to the direct memory address ports controlled by the I/O microprocessor, Ontel said.

The microprocessor for CPU functions is an Intel 8080 with 2 microsec cycle time and an 8-level interrupt capability.

The asynchronous adapter is an RS-232 interface that can handle rates of 110- to 9,600 bit/sec with data transmission in character or block mode, full or half duplex.

The synchronous controller is an RS-232-compatible interface that handles rates up to 50 kbit/sec in direct point-to-point or multipoint transmissions, the firm said from 250 Crossways Park Drive, Woodbury, N.Y. 11797.

Tano

DALLAS – Tano Corp.'s Booth 1126 will be centered around the Outpost 7 intelligent terminal.

The CRT terminal with standard teletypewriter-compatible keyboard and 10-key numeric pad features a 96-character upper- and lower-case Ascii set on a 24 by 80 display. Memory capacity is 8K bytes expandable in 4K increments up to 64K bytes.

Data transmission is possible at speeds from 110 bit/sec to 9,600 bit/sec in serial asynchronous mode. Program storage is on tape cartridges and an optional serial printer interface is available.

The terminal also permits data editing and allows the user to generate custom CRT formats, Tano said.

The basic terminal with 8K of memory, keyboard, CRT, tape and communications interface costs $4,690. Tano is at 4521 W. Napoleon Ave., Metairie, La. 70001.

Datagraphix

DALLAS – Datagraphix, Inc. is planning its Booths 1887 and 1889 around the Model 132A display terminal, which features a 132-column output format.

Microprocessor-controlled, the 132A offers a 96 upper- and lower-case Ascii set, a 60- or 120-line buffer, cursor control, single-line editing, tabbing, scrolling, dual brightness, multiple asynchronous transmission speeds of 110- to 9,600 bit/sec in full- or half-duplex mode and an optional 132-column serial printer.

The basic unit has 8K buffer memory with 16K optional. All functions including cursor sensing and addressing are controllable from the host computer, the vendor said.

The terminal displays 30 lines on an 8.5- by 11-in. screen with a 60-cycle refresh.

The basic 8K unit costs $3,950 and is available from Datagraphix at P.O. Box 82449, San Diego, Calif. 92138.

Volker-Craig

DALLAS – Volker-Craig Ltd. will be showing its line of Teletype-compatible CRTs priced from $1,595, in Booth 1095 at NCC here.

Standard features include RS-232C interface, nonglare CRT, keyboard with cursor control key cluster, direct cursor addressing and data rates up to 9,600 bit/sec.

The firm is based at 266 Marsland Drive, Waterloo, Ont. N2J 3Z1, Canada.

Megadata

DALLAS – Booth 2029 will be the place where Megadata Corp. will display its Model 700 Universal Emulating Terminal System (UETS).

The programmable terminal has a 12-bit microprocessor, 15-in. diagonal display and a 126-station keyboard that includes up to 71 function keys and 12 status indicators.

Some of the terminals that can be emulated by the system include the IBM 3270, 2260, 2740 and 2741; the Honeywell VIP 7700; the Control Data Corp. 217A/B; and the Univac Uniscope 100 and 200, Megadata said.

In addition to communicating with host computers, the terminal can also be used to drive such peripherals as printers, floppy disks, cassettes, paper tape equipment and disk systems, the firm said from 35 Orville Drive, Bohemia, N.Y. 11716.

Computer Devices

DALLAS – The line of Miniterm terminals will be displayed by Computer Devices, Inc. (CDI) in Booths 1513, 1515 and 1517 at NCC here next week.

The models 1201, 1203 and 1204 of the series were described as compact units, with the 1201 a receive-only terminal for such applications as CRT hard-copy output and minicomputer printing consoles.

The 1202 is a keyboard send/receive unit with selectable 10-, 15- or 30 char./sec printing speeds and an RS-232 interface with three modes of operation: Teletype, typewriter and numeric.

The Model 1203 is a portable unit with a built-in modem and acoustic coupler and the same features as the 1202.

The 1204, the newest member of the Miniterm family, is an automatic send/receive terminal with an integral minicassette providing storage of up to 68,000 characters per cassette, with 83-character block recording and off-line block and character editing capability. It also has an 8K memory expandable to 32K, which includes up to 7K for editing work space.

The unit has a 1,000-character buffer and a 35 char./sec printing speed, according to CDI at 9 Ray Ave., Burlington, Mass. 01803.

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Terminals at NCC

Termiflex Corp.

DALLAS – The highlight of the Termiflex Corp. exhibit will be four interactive hand-held alphanumeric terminals.

The HT/3 displays a single line of 12 alphanumeric characters and sells for about $500. The HT/4 has 24 characters in two lines and costs slightly more.

Both units operate at 1,200 bit/sec, have even parity, display the 64-character Ascii set and operate in full-duplex mode.

The HT/5 was designed for applications where only the status of certain functions needs to be displayed. The terminal has an annunciator display of 12 labeled lights and a full alphanumeric keyboard.

The HT/8 features a display of 80 upper- and lower-case characters and operates at 10-, 15-, 30- or 120 char./sec in full- or half-duplex mode.

Alphanumeric Terminals

All the units provide two-way, bit-serial, asynchronous communications of Ascii codes and are RS-232C compatible.

Termiflex, which will be in Booths 1600 and 1602 for the conference, can usually be found at 17 Airport Road, Nashua, N.H. 03060.

Spatial Data

DALLAS – The Eyecom Picture Digitizer and Display Terminal will spotlight Spatial Data Systems' Booth 2013 at NCC here.

The terminal permits automatic input of grey-tone pictures, line drawings and optical character recognition (OCR) numerals in addition to keyboard data entry and full alphanumerics, the firm claimed.

The unit should find use in applications such as the storage and retrieval of pictures for automatic typesetting, OCR reading of numerals on ID cards or automatic line drawing input and editing in computer-aided design systems.

The firm is at Box 249, 508 S. Fairview, Goleta, Calif. 93017.

Comtek, Inc.

DALLAS – Comtek, Inc. will introduce the Comtek-21, an intelligent terminal system, in Booth 2045.

The unit features a standard 8K memory expandable to 12K and a minifloppy disk built into the unit. The 1,200 bit/sec communications modem is also built into the system.

The unit has a hard-copy printer with 25-character columns that operates at 420 line/min.

There is a 16-character prompting LED display and an alphanumeric and 10-key numeric pad with the system. Options include a light pen scanner, floppy disk system and parallel interface.

Software with the system includes data entry programs for payroll, general ledger, accounts payable, accounts receivable and inventory and a general-purpose format program, according to the firm.

The unit rents for $165/mo including maintenance, Comtek said from home base at 4216 McCullough, San Antonio, Texas 78212.

Magnavox

DALLAS – A line of plasma display-based graphics terminals will be shown by Magnavox Display Systems in Booths 1277 and 1279.

The latest member of the family – a stand-alone graphics terminal – will be introduced at the show. An upgrade of the Orion-60 series, it has resident Basic containing graphics extensions, a disk drive and up to 56K of expandable random-access or read-only memory.

The basic Orion-60, with prices starting at $5,995, contains an Intel 8080 microprocessor and features such items as touch-panel operation; rear projection of film images; a 2K-byte random-access memory for downloading of customer-designed character sets; and the ability to emulate such terminals as the Tektronix 4010 series, the firm said.

The company is located at 2131 S. Coliseum Blvd., Fort Wayne, Ind. 46808.

Data Specialties

DALLAS – Data Specialties, Inc. will introduce a paper tape reader/punch which will attach to any terminal through the RS-232 or current-loop connector.

Shown in Booth 1525, the unit features full/half duplex, line/local, search/edit control and selectable speeds.

The SRP-300 can be remotely controlled from the line or terminal through the standard DC1-DC4 codes. The unit is priced at $2,095, the firm said from 3455 Commercial, Northbrook, Ill. 60062.

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CW667

Terminals at NCC

General Electric

DALLAS – A free-standing magnetic tape terminal featuring character string switch and a multiform printer will be the highlight of Booth 1585, operated by the Data Communications Product Department of General Electric (GE).

The Terminet Magnetic Tape Terminal is available in either single- or dual-cassette versions with two RS-232C interfaces to accommodate a data set and a printer, CRT or other peripherals.

Magnetic Tape Terminal

Block recording allows the user to select block lengths of 88-, 144- or 166 characters through a strapping option; data storage capacity ranges from 100,000- to 125,000 characters, the firm said.

The cassette is Ansi-compatible and the read/write rates are switch-selectable at 10-, 20-, 30-, 120- and 240 char./sec. The single-drive unit leasea for $63/mo and sells for $1,875.

The Terminet Multiform Printer can print nine-part forms at a rate of 30 char./sec, GE said. The operator selects the number of copies needed.

The printer is priced at $1,675, according to the division in Waynesboro, Va. 22980.

Delta Data Systems

DALLAS – Delta Data Systems Corp. will exhibit the Delta 3700C cluster system for distributed processing applications in Booths 1276 and 1278.

The 3700C is a floppy disk system that allows up to eight Delta 4000, 4300E or 4500 CRT terminals and two serial read-only printers to share access to up to 1.5 million bytes of storage.

Also on display will be the Delta 4050 microprogrammable CRT terminal for Burroughs, Honeywell and Univac emulation in multidrop data communications networks; the Delta 4300E text processing expanded refresh CRT terminal with up to 8.5K bytes of memory and full text manipulation features; and the Delta 4500 user-programmable CRT terminal with up to 16K bytes of memory designed for interactive and off-line intelligent data processing applications.

Delta Data is based at Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

Questronics

DALLAS – Questronics, Inc. will be at Booth 1645 to debut its Printing Response Time Monitor and show its terminal performance monitor.

The Printing Response Time Monitor has a built-in 20-column matrix printer which prints response time information either automatically or on command for terminal-monitoring applications. It can monitor up to four terminals at a time.

The response time threshold can be set manually, Questronics said. When this is exceeded, the transaction time and the time of day are printed out.

The Terminal Response Time Monitor was designed to measure the performance of interactive terminals and can measure the response time of each transaction, computing the average of these times and retaining the minimum and maximum response times which have occurred.

It uses an optical coupler system and is under the control of a microprocessor. It costs $950, the firm said from 3596 S, 300 West, Salt Lake City, Utah 84115.

Eprad

DALLAS – The Applications Group of Eprad, Inc. will have its terminal line out for inspection at Booth 2127 at NCC here.

The AG-60 graphics terminal features three character sets, a 512 by 512 dot matrix for graphics and a selection of two keyboard styles, a touch panel and sonic pen for graphics.

The AG-90 features a data rate of 110- to 9,600 bit/sec and a plasma display panel with an active area of 2.5- by 8 in.

The AG-60 costs $750 and the AG-90 starts at $1,750, the firm said from 123 W. Woodruff, P.O. Box 4712, Toledo, Ohio 43620.

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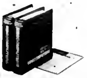

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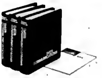

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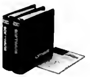

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... And Other Things to See

Megatek

DALLAS – Megatek Corp. will announce its Megraphic 5000 series of refresh graphic terminals and systems in Booths 1216 and 1218.

Standard features include 12-bit (4K by 4K) screen resolution, a 21 in. electromagnetic monitor, hardware blink, translation, dashed lines and constant intensity vectors, Megatek said.

Also included as part of the package is a Data General Nova 3 minicomputer, expandable to 128K words, and an upper/lower case keyboard with 20 function keys.

Micro-Based Display

The Megraphic 5000 system features a microprocessor-based graphic display unit, the MG552, which occupies two slots in the Nova and provides digital-to-graphic conversions, control and display functions. Standard and user-definable hardware character sets are available.

The Megraphic 5000 costs between $20,000 and $25,000 depending on options, the firm said from 1055 Shaffer St., San Diego, Calif. 92106.

Nine From Britain

DALLAS – Nine British firms, under the sponsorship of the Business Equipment Trade Association, London and the British Overseas Trade Board, are planning to participate at this year's NCC with a variety of the latest equipment from abroad.

Modular Technology will feature its Minimodem, an acoustically coupled, portable device which can operate up to 300 bit/sec. Also on display in Booth 1808 will be the Interfaker, a diagnostic and patching aid for modems and terminals. Modular Technology can be reached at P.O. Box 117, Watford WD1 4PD, England.

The Datapad data entry system will be shown by Quest Automation, Ltd. in Booth 1812. Datapad consists of a special writing pad, a small display and a minicomputer equipped with the firm's special software. The system allows data to be entered on the special pad using any pen or pencil using almost any freehand writing style. Quest Automation is at 26 Cobham Road, Ferndown Industrial Estate, Stepehill Wimborne, Dorset BH21 7NP.

Calculus computer tape is being exhibited by Racal-Zonal, Ltd., which will also show a range of accessories including the type BU4000 magnetic tape cleaner and digital cassettes. Racal-Zonal can be found in Booth 1806 or at its U.S. representative, Racal Communications, 5 Research Place, Rockville, Md. 20850.

The problems of plant layout, pipe routing and pipework design can be tackled by the Pipework Design Management System, to be shown by Computer Aided Design Centre in Booth 1705. The centre can be contacted at Madingley Road, Cambridge, England.

The items on display at Sintrom's Booth 1707 will all be related to the 3M-type DC 300A data cartridge, the Perifile 6000C minicomputer peripheral and the Perifile 6041 buffered tape emulator. Sintrom's U.S. distributor is Marquest, Inc., 2315 Otis Ave., Santa Ana, Calif. 92704.

Management Systems and Programming will feature the Manager line of software packages, including Datamanager, a data dictionary system; Testmanager, a structured programming testing system; and Projectmanager, a project control system. Situated in Booth 1711, the firm can be reached through its U.S. subsidiary, MSP, Inc., 594 Marrett Road, Lexington, Mass. 02173.

Facit-Addo, Inc., 66 Field Point Road, Greenwich, Conn. 06830, will show a range of automatic line indicating machines called Facit Liners, which are full frontal copyholders used to ensure copy is visible at all times. The two basic models take copy up to 13 in. by 10 in. and 13 in. by 16-1/2 in., respectively, and are designed for use in typesetting or terminal keyboard equipment. The Facit Liners can be seen in Booth 1810.

Two British publishers are also taking booths. IPC Electrical-Electronic Press, Ltd., in Booth 1709, will feature two of its journals: *Computer Weekly*, covering international news, and *Data Processing*, which provides in-depth coverage of computer management. Gershire, Ltd., in Booth 1713, will feature the monthly *Systems International*, a magazine directed to computer designers, users and software specialists. IPC Press is at Dorset House, Stamford St., London SE1 and Gershire can be contacted through Larry Krasner, 14241 Ventura Blvd., Sherman Oaks, Calif. 91413.

Attendees who wish to contact the Business Equipment Trade Association will find representatives of the group in Booth 1804.

Clinton

DALLAS – A wide range of CRTs will be shown in Booth 1149 by Clinton Electronics Corp.

The units are designed for applications such as data displays, medical electronics and video recording monitors. The exhibit will feature the firm's "Superfubes" with high contrast phosphors, the firm said. Clinton is located at 6701 Clinton Road, Rockford, Ill. 61111.

Anderson Jacobson

DALLAS – Anderson Jacobson, Inc. (AJ) will display communications hardware in Booths 1780, 1782 and 1784.

The latest AJ products being shown for the first time are the AJ 860 teleprinter terminal and AM 211 and A 211 acoustic couplers designed to CCITT specifications to handle international telephone styles.

Designed for interactive operation with mainframe time-sharing or transaction processing applications, the AJ 860 is a 60 char./sec matrix printer with three switch-selectable print speeds, including a keyboard with 17-key numeric pad.

The teleprinter also features self-diagnostics and 132-column printing, a spokeswoman said. It is priced at $2,950.

The acoustic couplers can handle 300 bit/sec communications in half- or full-duplex originate-only modes.

The AM 211 differs from the A 211 in that it can attach directly to telephone lines. Both couplers have acoustic interfacing capabilities, the spokeswoman said.

The AM 211 costs $495; the A 211 price was unavailable from the firm at 521 Charcot Ave., San Jose, Calif. 95131.

Tandberg Data

DALLAS – Tandberg Data, Inc. will use Booth 1065 to display its TDV 2100 series of CRT terminals and its TDI 1050 synchronous tape transport.

The TDV 2100 contains a microprocessor and can be equipped with up to four cartridge recorders or four IBM-compatible diskette units.

The basic unit has 2K of memory, which can be expanded to 64K. Software with the system includes Assembler, Debug, Editor, Basic Interpreter and a Tape Operating System, the firm said, adding the basic unit is priced at $7,000.

The TDI 1050 tape transport is a microprocessor-based unit that reads and writes data at densitites of 1,600 char./in. phase-encoded or 800-, 556- and 200 char./in. NRZI at speeds of 12.5- to 45 in./sec, either 7- or 9-track.

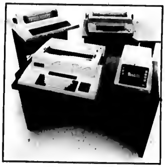
The transport is priced at $2,990, the firm said from Suite 407, 4901 Morena Blvd., San Diego, Calif. 92117.

Aspen Ribbons

DALLAS – A line of ribbons for Diablo Hytype printers and printers from Qume, Burroughs, Interdata and IBM, plus ink rolls for Decision Data, Burroughs, Univac and Printec equipment, will be featured in Booth 1874 by Aspen Ribbons, a United Recycle Co., 1700 N. 55th St., Boulder, Colo. 80301.

Fenwal

DALLAS – Fenwal, Inc.'s Halon 1301 fire suppression system will be shown with live demonstrations in Booths 2064 and 2065. Fenwal's address is P.O. Box 309, Ashland, Mass. 01721.



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...And Other Things to See

American Microsystems

DALLAS – The MDC-140 computerized logic analyzer will be introduced by American Microsystems, Inc. (AMI) at this year's NCC in Booths 1051 and 1053.

The 40-channel analyzer allows 1,024 steps to be traced and formatted under total software control, the company said. The unit is designed to work with AMI's microcomputer development system.

The MDC-140 connects to any digital circuit through a set of probes; both a 40-pin DIP-clip and a set of 40 individual hooks are available, The probe thresholds can be adjusted in groups of 10 for any level from -15 to +15 V. With software-controlled formatting of the captured signals, any design can be checked – not just MOS microprocessors, but other families or mixtures as well.

Working through the development system's CRT and keyboard, the operator can specify two separate 40-channel qualifiers, a post-qualification delay of up to 64K clock cycles, another qualifier which generates data-dependent clock cycles and a fourth qualifier which pulses its own outbound trigger line for external gear. All these qualifiers can be combined in various ways with the analyzer's 10 MHz clock source or with either edge of an incoming user clock signal, the company explained.

Once the qualifiers have taken effect and the specified delay has elapsed, 1,024 captured steps can be displayed in pages of 16 lines. The format of each line is under user control: binary, Ascii, hex or symbolic lists.

Each format can be brought in from a floppy disk file and modified as needed, because the software supporting the MDC-140 includes a built-in text editor. Modified formats can also be saved on a disk file for future use,. AMI said.

The MDC-140 is a plug-in peripheral option for AMI's microcomputer development center, the MDC-100.

An MDC-100 with 6K of firmware, 2K addressable display random-access memory (RAM), 16K user RAM (expandable to 48K) and a dual floppy disk drive costs $9,600. The MDC-140 hardware costs about $4,000. AMI is at 3800 Homestead Road, Santa Clara, Calif. 95051.

Pro-Log Corp.

DALLAS – A random-access memory (RAM) buffer option for the Series 90 programmable read-only memory programmer (Prom) will be the featured attraction at Pro-Log Corp.'s Booth 1089.

The 9107-1 buffer option provides 1K of work space where Prom code can be accumulated and manipulated prior to programming a blank Prom. The buffer can be loaded from the Series 90 keyboard or from the master Prom. The copy Prom can then be programmed directly from any portion of the buffer.

Other features include sequential display and loading or buffer contents, editing capabilities, and duplication, verification and reset modes.

The unit is priced at $300 with immediate delivery from Pro-Log at 2411A Garden Road, Monterey, Calif. 93940.

Knickerbocker Case

DALLAS – Computer servicemen will have an opportunity to examine a vast array of tool cases made by the Knickerbocker Case Corp.

The cases are made of wood covered with vinyl or leather and can hold either tools or parts. A special Ajusta Case holds printed circuit boards of almost any size. The company also makes custom-designed cases to fit individual needs.

Located in Booth 1202 at the show, Knickerbocker can be reached at 2950 W. Chicago Ave., Chicago, Ill. 60622.

Elgar

DALLAS – Elgar Corp. will introduce a line of high isolation transformers in Booths 1008 and 1010.

All models are connectable for 120 VAC or 240 VAC input or output, which enables them to be used as a combination stepdown transformer and noise isolation device. All models are also rated for either 50 Hz or 60 Hz operation and prices start at $290, the firm said from 8225 Mercury Court, San Diego, Calif. 92111.

Data Maintenance

DALLAS – Data Maintenance, Inc. will introduce the DMI 600 disk pack inspector in Booth 1807.

The unit, priced at $2,350, provides radial and axial runout checks of disk services with a series of comb gauges and can be used to inspect all standard IBM packs, including the 1316, 2316 and 3336-11. It can also be used for Univac's 8416 and 8418 packs, Burroughs' B-206 and Calcomp's Trident series. Data Maintenance can be reached at P.O. Box 2727, Rolling Hills Estates, Calif. 90274.

McGraw-Hill

DALLAS – McGraw-Hill Book Co. will be displaying its magazine *Data Communications*, textbooks and professional and reference books in the DP field.

In addition, the publishing firm will provide information about its Computer Professionals' Book Club.

McGraw-Hill, 1221 Avenue of the Americas, New York, N.Y. 10020, will be located in Booths 1744, 1746 and 1748 for the conference.

Sargent & Greenleaf

DALLAS – Sargent & Greenleaf, Inc. will show its line of security mechanisms in Booth 2022. The line features the Code/Tronic II, a single-door access control unit that has up to 10,000 four-digit combinations, as well as the Brute electric lock, the 8077 padlock, combination locks, deadbolts and file cabinet locks, the firm said from One Security Drive, Nicholasville, Ky. 40356.

Deltec

DALLAS – Uninterruptible power systems (UPS) and line monitors will be shown in Booth 1004 by Deltec Corp.

Included will be the Model 5246A 3 kVA UPS priced at $4,490, the model DSU710 available in power levels of 1,200 VA and 1,800 VA for a price of $1,910, and the model DLC AC line conditioner. The firm is located at 980 Buenos Ave., San Diego, Calif. 92110.

Instrumentation and Control

DALLAS – The E-PAC mini-micro uninterruptible power supply from .5 kVA to 75 kVA will be shown in Booth 1679 by Instrumentation and Control Systems, Inc., Electro-Pac Division, 129 Laura Drive, Addison, Ill. 60101.

Exide Power

DALLAS – Exide Power Systems Division of ESB, Inc. will introduce three uninterruptible power systems (UPS). The three static inverters (30, 60 and 100 kW) will broaden the Exide line in smaller UPS applications and will be seen in Booth 2050.

Digitally controlled, the step-wave inverter three-phase 60 Hz system allows 208 V to 480 V in or out; 50 Hz systems allows 380 V in or out.

System features include subcycle current control which corrects voltage every 700 μsec; steady-state voltage regulation, ±1%; instant fault clearing current; bumpless transfer of load; overload capacity 125% of rated kVA for 10 minutes or as high as 300% line-to-neutral current for 10 cycles.

Exide is at Rising Sun and Adams Avenues, Box 5723, Philadelphia, Pa. 19120.

Media Recovery

DALLAS – Media Recovery, Inc. is planning to demonstrate Shockwatch, a precision impact recorder for use with disk storage devices. The unit changes colors to indicate whether the disk has been subjected to a mechanical shock or force great enough to cause a malfunction.

Shockwatch will be shown in a variety of situations at Booth 1686. It costs $6 and can be obtained from Media Recovery at P.O. Box 867, Graham, Texas 76046.

Datapro Research

DALLAS – Datapro Research Corp. will introduce its "Report on Word Processing," a monthly updated information service, in Booths 1521 and 1523, the firm said from 1805 Underwood Blvd., Delran, N.J. 08075.

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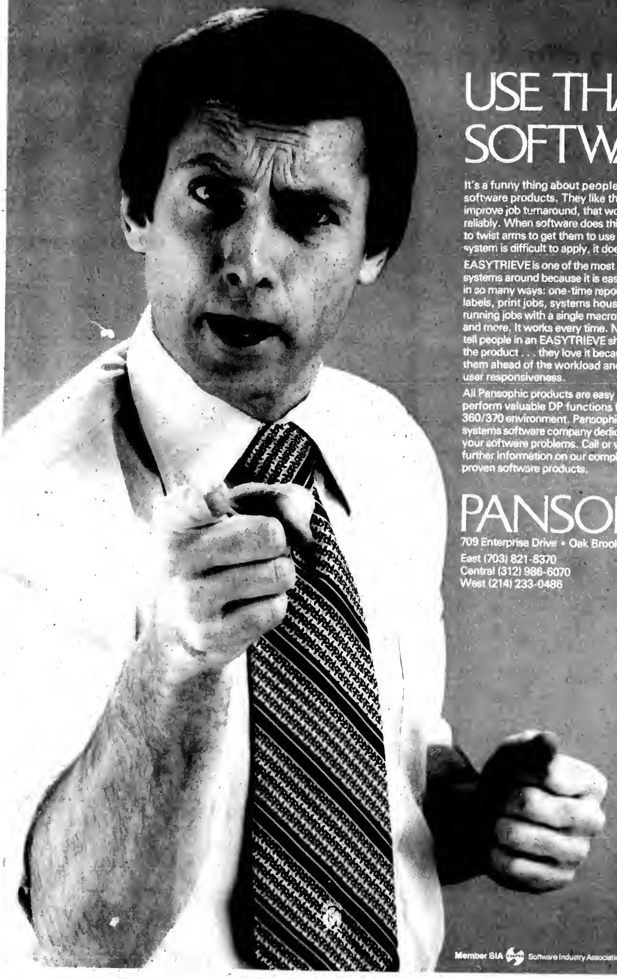

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CI Notes

STC, Memorex Admit Talks, But Deny Merger Definite

SANTA CLARA, Calif. — Memorex Corp. and Storage Technology Corp. have reported discussions of a possible merger.

STC chairman and president Jesse I. Aweida noted that "at the present time we are in the early stages of discussions and no agreement, commitment or undertaking has been made nor can any assurance be given that the discussions will result in an agreement or merger."

Robert C. Wilson, chairman and chief executive of Memorex, issued a similar statement, calling the discussions on a possible merger "exploratory."

SBS Issues RFP

McLEAN, Va. — Satellite Business Systems (SBS) has invited U.S. satellite manufacturers to bid on the construction of three advanced, high-powered communications satellites for the SBS operational system.

The satellites are to operate at the higher frequency ranges of 12- and 14 gHz.

Proposals should be submitted by Aug. 8, according to the request for proposals (RFP).

Azurdata Sues MSI

RICHLAND, Wash. — Azurdata, Inc. has filed suit in the Federal District Court in Seattle, Wash., against MSI Data Corp. charging patent infringement.

The charge includes the recently introduced MSI/77 terminal.

Azurdata is seeking a declaratory judgment of invalidity and noninfringement of MSI Data's U.S. Patent No. 3925639.

Correction

Real Decisions Corp., a consulting company which recently received a contract from the Department of Housing and Urban Development (HUD), will have three months to supply the agency with a benchmark package for use in choosing a remote computer services vendor from those in the General Services Administration's Teleprocessing Services Program (TSP) [CW, May 16].

The technically qualified vendor who comes out on top in the benchmarking procedure will provide computer services to HUD for 36 months.

During the first 18 months, the agency will develop the programming for its mortgage insurance accounting system. The TSP vendor's services will be required during the second 18 months to operate the system.

Cites International Threats

Roth Proposing Cabinet Post for Trade

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. — Sen. William V. Roth Jr. (R-Del.) has called for the creation of a new Cabinet-level Department of International Trade and Investment because he believes the U.S. has suffered long enough from an "outmoded, ill-defined" international economic apparatus.

"We must act to coordinate and focus our strength or we will be outguessed, outflanked and outmaneuvered by the competition," Roth told a recent meeting of the Western Electronics Manufacturers Association (Wema) here. Many Wema members are U.S. semiconductor companies who have been hard-hit in recent months by Japanese firms staking out U.S. memory and microprocessor markets, a spokesman for the association said.

Roth will introduce legislation sometime next month with the objective of creating "an effective, coherent foreign trade policy" to deal with such trade issues as the profusion of Japanese electronics exports to the U.S. and restrictive Japanese import practices.

His bill would establish an executive department incorporating:

- The President's Special Trade Representative and his office.
- The international business and export control functions of the Commerce Department.
- The antidumping, countervailing duty and customs administration functions of the Treasury Department.
- The trade agreements and commercial opportunities functions of the State Department.
- The statistical reporting work of the International Trade Commission.

The Export-Import Bank of the U.S. and the Overseas Private Investment Corp. are also included in Roth's proposal as semiautonomous bodies in order to align their activities more closely to general U.S. trade policies and programs.

Roth hopes his bill "will streamline foreign trade and investment policy. It will centralize our vast resources and the information you need in planning corporate initiatives in this area," he told Wema's members.

Sen. William V. Roth Jr.

"By providing a clear locus of authority for decision making in international trade and investment policies, we will be strengthening this country's ability to be a tough bargainer in negotiations with our trading partners," he added.

The senator believes his plan is consistent with the Carter Administration's stated objectives "to make government more responsible to the society it serves and to consolidate governmental bureaucracy."

In the meantime, Roth called on the Administration to "take whatever steps are necessary to ensure that the Japanese government, in coordination with the Japanese industrial sector, reduces barriers to fair trade."

These steps should include simplifying import regulations, ensuring the integrity of patented products, honoring antidumping regulations and reducing internal distribution barriers, Roth said.

Services at Issue

Adapso, Members Sue Citibank

By Toni Wiseman
Of the CW Staff

NEW YORK — The Association of Data Processing Service Organizations (Adapso) and six of its largest member firms have filed suit here asking for a declatory judgment against Citibank N.A. and the U.S. Comptroller of the Currency.

The complaint, filed in the U.S. District Court for the Southern District of New York, asked the court to issue a permanent injunction restraining Citibank from selling or leasing DP services and the Comptroller from authorizing national banks to sell such services.

The Adapso suit claims that interpretive rulings by the Comptroller violate the National Bank Act and the Bank Service Corporation Act because neither authorize banks to sell computer services to the public.

In its citation, Adapso said Citibank, presumably acting under the asserted authority of the Interpretive Ruling by the Comptroller, announced its intention in December 1976 to offer computer time-sharing services to business firms.

Citibank subsequently advertised that it would market such services at 50% of the prevailing charges, indicating an intent to market the services on an incremental basis, Adapso said. Citibank also advertised its intention to make available financial application packages and a data communications network capability, the association added.

As a result of Citibank's move into commercial time-sharing services and the Comptroller's interpretation of the banking acts, the computer services industry faces illegal competition at "ruinously low prices

(Continued on Page 55)

IBM Pricing Depressed Market, Hurt Industry Margins: Broker

By Molly Upton
Of the CW Staff

NEW YORK — Computer stocks hit new lows after IBM moved to "close up its price umbrella"—and the depressed prices may well remain through the second quarter, according to Harry Edelson, vice-president of Drexel Burnham & Co., an investment firm here.

By leapfrogging some of its prices into the competitive range occupied by other mainframers, IBM reduced not only its own profit margins, hut those of the other firms as well, Edelson said.

IBM had the largest profit margin to start with — 26% — followed by Data General Corp. (23%), Burroughs (17%), Digital Equipment Corp. (14%), Univac (8%) and NCR (6%), he added.

Although Burroughs, with a larger margin than the other mainframers, has announced an average of 20% price reductions on its large machines, the other firms have "played it close to the vest," Edelson said.

These firms pretty much held the line for a while, then made selective cuts, he noted, adding he expects them to continue making selective cuts as needed.

"Any company can keep pace with IBM on product development; it's a matter of whether they can keep the price umbrella where it was before. If the price umbrella narrows, they possibly stand to lose some business and, also, elasticity of demand is not going to take effect at the high end as

(Continued on Page 54)

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BASF to Put Toe in OEM Waters at NCC Next Week

By Toni Wiseman
Of the CW Staff

BEDFORD, Mass. — BASF Systems will be signaling its tentative entry into the minicomputer OEM hardware field in the U.S. when it introduces the Model 6106 mini floppy disk drive at the National Computer Conference (NCC) in Dallas next week.

The 6106 was functionally designed for the standard 5.25-in. floppy disks. The single-density disk has a track-to-track access time of 20 msec with head loading time of 35 msec, according to BASF.

The drive can transfer up to 125 kilobits of information per second, the company added.

BASF has had hardware in the past, such as disk drives and controllers back in the 1969-1970 timeframe. When IBM cut its prices and a large number of competitors entered the field, however, it took a second look and decided that market wasn't for it, according to John Healion, director of marketing for computer and business products.

As a result, BASF is known only as a major supplier of magnetic tape and disk media in the U.S., while its parent company in Germany, BASF AG, markets both hardware and media in Europe.

Three-Stage Evaluation

BASF is currently in the second phase of a three-stage evaluation program to guage the level of market acceptance for the main drive before actually adding it to its U.S. product line, Healion said.

In the first phase, BASF interviewed representative members of various application groups to judge whether the device makes sense for that application. These groups represent point-of-sale (POS), electronic funds transfer (EFT), desktop computers and word-processing applications.

This study showed that word processing, tabletop computers and hobbyists will be good markets for the mini flexible disk, either because of its low price or because of its size, he said. POS and EFT are looking for more storage capacity than the disk offers, he noted.

"We're not looking for replacement markets," Healion said, "but for new items to create on new markets."

The current second phase of the evaluation is an expansion to investigate potential market areas in more detail and to determine potential volumes to which accounts and through what distribution methods.

If interest at NCC supports BASF's thesis that there is a viable market for the disk, the third phase will be to set up a manufacturing and marketing structure for the new products, Healion said, neither of which will cause any great problem.

In fact, to speed up initial deliveries, the products could be imported from Germany to allow immediate marketing while the firm gradually implements manufacturing capabilities.

"One of the reasons, advantages, of starting off with a device like this mini drive is that all the development, the up-front frustration, has already been done in Germany," he said. This will eliminate a lot of the tooling and dieing problems and costs as well, he noted.

"To be successful in the OEM market in the U.S., the product has to be manufactured here," Healion said, noting one reason for this is that competiton is much keener than overseas.

Facing Competition

BASF will be facing competition from Shugart, Wangco and Diablo if it decides to go ahead, but it has not formulated a marketing strategy as yet.

BASF views this venture as the initial phase of expanding its line in terms of developing into bigger, more sophisticated devices.

BASF AG, for instance, has been working with plated disks for video applications for accounts interested in very high capacity, and has over five years' experience that is available to all BASF subsidiaries, he noted.

Healion sees a major strength for BASF in its ability to manufacture both the peripheral device and the media.

"The OEM is a very sophisticated market, highly technical. You have to design your media to perform at peak on the drive, and you have much more control over that performance if you manufacture both products," he said.

It's also easier for the OEM to deal with one supplier, rather than two, he added.

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IBM Moves Depressed Stocks: Broker

(Continued from Page 53)

quickly as at the low end," Edelson said.

"It's certainly not the end of the computer business, but it will hurt profit margins," he stated.

Although minicomputers, with declining prices, have proved the market is elastic and expands with decreasing prices, this phenomenon is less likely to occur with large machines, he noted.

One reason is that large users don't generally have the manpower and the additional investment required to support more large mainframes, he explained.

Long Depression

The computer industry's stocks are extremely depressed and this is one of the reasons the whole stock market has been depressed because IBM is something of a bellwether stock, Edelson said.

For the first time ever, IBM has had over a 4% yield; the stock went below 250 and it pays dividends of $10, he pointed out.

A lot of people think IBM should gain some support on a yield basis, but earnings will not be good for IBM in the second quarter; it's a tough comparison since it had such a good second quarter last year, he explained.

Burroughs also could have difficulty then, and these two are the bellwethers of the group.

It's thus very possible that stocks for the industry as a whole could remain depressed through the second quarter, he said.

IBM will be looking much better next year since it will be shipping the 3033 plus possibly an unannounced replacement for the 370/158, and it will still be shipping the 138 and 148 in volume as well as the System 34 and everything else, Edelson said.

Generally IBM has stronger periods the year after the introduction of major products, he added.

By August or September, investors will be looking at some attractive stocks in the computer group, whereas Edelson is not sure the downward pressure will abate in the near term.

Incentive to Buy?

Although the purchase price cuts might encourage people to buy systems, this incentive is offset by a couple of factors, Edelson observed. People will either postpone delivery of a 168 and wait for the 3033 or will rent — not buy — a 168 until the 3033 is available.

Where IBM will really feel the effects of its price cuts is in the smaller checks it will receive for systems on rent, Edelson indicated. Rental revenues account for two-thirds of IBM's total revenues, he said.

And it will be a while before elasticity of demand takes hold and users start buying more memory at the new, lower prices.

"That will be the major reason for the downturn in earnings estimates," he said. Drexel Burnham is forecasting $17.40 for IBM this year and over $20 next year in comparison with $15.94 last year," he said.

"We don't look for a great year for IBM. We still recommend it as a buy, but we caution that IBM will probably not outperform the market in the near term," he added.

The lows hit by the computer stocks are not unique to that sector, he said, since the moves fit in with the pallor of the stock market as a whole, Edelson contended.

"There was already a negative climate when IBM made its price reductions," he said, commenting on the unfriendly mood toward high growth stocks.

Only Honeywell, which receives a major portion of its income from the controls business, has remained relatively unscathed on the stock listings, he said.

IBM hit a new low since at least a year ago, and DEC and DG approached their lows, he said.

Contracts

International Telephone and Telegraph Corp.'s Defense Communications Division has been awarded a $36 million first-phase contract by the Air Force Electronic Systems Division to design and provide the functional prototype of the Strategic Air Command Total Information Network.

Computer Sciences Corp. has been awarded three contracts, a $20 million contract from the Department of Defense for systems engineering and integration; a $3 million support contract from the Energy Research and Development Administration; and a DP management contract from the Environmental Protection Agency.

International Business Machines of Manassas, Va., has received a $3 million cost-type letter contract from the Naval Air Systems Command for P-3 advanced signal processor display and control systems units.

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Calls Tax Reform the Answer

Conable Urges Risk Capital Promotion

By Edith Holmes
Of the CW Staff

WASHINGTON; D.C. — Congress needs to examine the whole problem of capital formation rather than deal with a tiny part of it every time there is a tax reform bill, according to Rep. Barber B. Conable Jr. (R-N.Y.).

The ranking Republican member of the House Committee on Ways and Means, which considers taxation legislation, said that in the meantime Congress might try to get more reasonable depreciation rules and lower interest rates to encourage the generation of risk capital.

Speaking before a recent meeting of the Western Electronics Manufacturers Association (Wema) here, Conable indicated these measures constitute no more than "the wise use of capital.

"I would trade away the investment tax credit in a minute for more reasonable depreciation rules than we have now," he told Wema members. In the past, Conable has generally supported the tax credit "because I had no other alternative."

Changes in the depreciation schedules and lower interest rates would help prevent funds from being tied up in capital goods for so long, Conable suggested. Lower interest rates would have the added advantage of encouraging people to save and invest in hopes of getting more back in the long term than they would by purchasing goods.

Current interest rates are so high that the public can't see that savings or investments are worthwhile, he said.

"We give lots of lip service in Washington in favor of capital formation," Conable stated. But when all was said and done in passing the Tax Reform Act of 1976, he noted, Congress increased and tightened the minimum tax, which has the effect of increasing the long-term tax on capital gains.

Biggest Public Danger

The biggest danger to the public and to business is that "the average congressman doesn't know what's going on" in this area, Conable said. Most thought the minimum tax would be a splendid device "for catching the few big fish who swim through the net."

Few considered the drastic effect the measure would have on risk capital formation, he added.

The House Ways and Means Committee formed a Task Force on Capital Formation, chaired by Rep. Al Ullman (D-Ore.), who also chairs the committee, to examine the overall pattern of capital formation, Conable told his audience.

The business community should stay in touch with this task force and with individual members of Congress. Too often, business people are "activists in this area only when they feel threatened," the congressman said.

The total tax burden is the problem behind the difficulties associated with raising risk capital, in Conable's view. But the only way to reduce this burden is to "reduce our expectancy of government," he said.

"We will be tricked if we think it can all be done with mirrors," he added. Many believe if Congress just cuts taxes a little more, the country will have more capital to work with, Conable said, adding that this was the thrust of President John F. Kennedy's tax cut program in 1963.

Such a cut may not have the desired effect on today's economy, he suggested. There is some question whether Kennedy's program generated more capital in the 1963-64 time frame, given the potential influence of such factors as the Vietnam War, Conable said.

The issue of capital formation is the key to the operation of the economy. Without risk capital, there can be no measured growth of the economy, Conable stated. "The problem with a riskless society is that it's a choiceless society," he said.

Conable said President Carter remains "the great imponderable factor" in the tax/capital formation future of the nation. The Treasury Department is working now to come up with a tax package by July or August, the congressman noted.

Rep. Barber B. Conable Jr.

Adapso Files Against Citibank

(Continued from Page 53)

for which we cannot compete," according to Jerome L. Dreyer, Adapso's executive vice-president.

Adapso members and others in the industry face "irreparable injury to their business from the illegal competition of Citibank and other national banks which may follow Citibank's lead," he added.

Bernard Goldstein, chairman of Adapso's Bank Relations Committee, said Citibank's intention to sell services at half the normal price is a digression from the manner in which banks compete among themselves and could be construed as a "predatory attempt" to destroy or dominate the services industry.

The services industry market is estimated at $5 billion to $6 billion. Goldstein could not estimate the market share which might be lost to Citibank, but said "if all banks in the U.S. follow, it would seriously injure our industry."

He also indicated that, in the historic sense, banks have not been very successful in market penetration because of the fitful nature of their participation, entering and then abruptly exiting. He cited Citibank's recent sale of its payroll application to ADP Network Services as an example.

Robert Weissman of National CSS stated that "we are not worried about another competitor in the field, but we believe the concept of maximum separation is critical and banks, by their nature, have the power and ability to compete in a way to which we cannot respond."

The Comptroller, he noted, has been named as a codefendant because the issue is important not only to Adapso, but to other industries as well who may compete with banks.

Joining Adapso as coplaintiffs are ADP Network Service, Comshare, Inc., National CSS, On-Line Systems, Inc., Quantum Computer Services and Tymshare, Inc.

Citibank Comment

In response to the filing, Citibank issued a statement noting it is selling excess computer capacity on a time-sharing basis, "an activity permissible for national banks under existing laws and regulations.

"We believe this activity is a sensible and economical use of the excess capacity that banks must maintain to assure timely processing during peak periods," Citibank stated.

The bank said its prices "reflect the full cost of providing time-sharing services to outside clients plus a reasonable profit."

Nickels & Dimes

Datapoint has filed an application for the listing and trading of its common stock on the New York Stock Exchange. Datapoint stock is currently traded over the counter.

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Atlantic Research has redeemed Susquehanna Corp.'s 84% ownership and for the time being the corporate ownership will reside in 10 members of upper management.

$$$

Cray Research has negotiated a $10 million revolving line of credit with five banks in Minneapolis and St. Paul. The funds will be used for construction and installation of computer systems.

Amdahl paid its first dividend of 5 cents a share on April 29.

$$$

Data 100 has arranged a $45 million five-year term credit agreement with a consortium of 11 banks, replacing a $41.3 million North American revolving bank credit agreement.

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Bergen Brunswig plans to discontinue its Health Application Systems line of business to halt the drain on consolidated results.

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Centronics plans to buy up to 100,000 shares of its common stock on the open market.

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Undergoing 'Rational Growth'

Data 100 Offering Full Terminal Line

By Ann Dooley
Of the CW Staff

MINNEAPOLIS – Data 100 Corp., a company that began as a single-function batch processing operation, has grown into a distributed DP firm offering multifunction terminals.

"We give our customers the chance to evolve their facilities along with Data 100," according to Bob Bernstein, director of product marketing.

They can go from remote batch to disk to interactive online, which is just the way Data 100 has progressed since its beginning, he said.

Data 100 began in Europe at the same time it started in this country in order to implement an international base for its large multinational customers, Bernstein said.

The company sells and services in 27 countries since customers prefer dealing with Data 100 directly in the country in which they are located, he added.

In addition to an international base, Data 100 has developed a third-party leasing structure. "Originally, we did it to be competitive with IBM and now we are able to work from a mature lease base," Bernstein said.

About 50% of Data 100's product line is key batch and, at the same time, the firm manages to have 25% of the remote batch terminal market, the company claimed.

"We offer our customers a price/performance consideration that is better than IBM," Bernstein said.

Data 100's newest product on the line, the multifunction Model 82, provides remote batch, data entry with remote batch and an on-line capability with everything else, according to Bernstein.

The company is undergoing a very "rational growth" period, Bernatein said. "We're migrating away from hardware and 55% to 60% of our budget is spent on software," he said. "That's where it's at today," he added.

"Most of the hardware is done and it's just getting the software and then implementing the new technology," Bernstein said.

Customer response has been favorable to Data 100's additive approach, he noted. Little or no retraining or software changes are needed when an additional function is added, he explained.

"Nearly 80% of our orders are from our installed base and we are pleased with that," he said. The customers obviously like what Data 100 is doing for them.

"What many people don't realize is that Data 100 is also a peripheral company. We have a heavy investment in line printers and we manufacture all our own peripherals.

"It's been one of our goals to manufacture as much of our own equipment as possible in order to maintain control," Bernstein said.

"Data 100 is a highly vertically integrated company," he added.

The company is working to understand the needs of the remote user who might be miles away from the host computer, Bernstein said.

"We plan to add more function, capability and intelligence while concentration on batch and remote business will continue to remain very strong. "It won't mean a lessening of our classical products, either," he said.

In 1976, revenues were $121.9 million, up 27% from 1975, according to company figures.

"Almost 61% of our revenues come from Fortune 500-type users, Bernstein added.

Data 100's customers are large, international companies with widely separated divisional headquarters, he said.

Applications range from basic financial and administrative DP for a mining and manufacturing company to determining the weight, horizontal and vertical wave loads and stress relationships that can be tolerated by marine structures for an engineering and construction firm, Bernstein said.

Right now, the demand from the market is larger than the industry can satisfy, he said. It's a buyer's market and the user has a large number of companies to choose from, he added.

"IBM is the top competitor and all others just pale in comparison," Bernstein said.

Data 100 is second to IBM in the batch terminal market, he said. "It's always easiest for the user to go with IBM so we answer by underpricing them and offering competitive service."

Market Strategy

Data 100's strategy is to only develop products as the market or their customer's needs require. The concentration is on marketing rather than developing new technologies.

Since many of the firm's customers use IBM mainframes or other equipment, Data 100's products must remain compatible and be as or more efficient than IBM products, the company claimed.

Functions are being repackaged and used in different functional mixes, Bernstein explained. The company can tailor installations to the individual user's needs by configuring standard off-the-shelf products, he said.

"We plan to continue offering this kind of multifunctioning line for the growing distributed DP market at least through the next decade," Bernstein said.

Orders & Installations

The Ohio College Library Center is installing the first four-processor Tandem Computers, Inc. nonstop computer system. The four interconnected processors will provide single-point network control supervision and eventually nonhost computer connections for the center's telecommunications network.

Automation Electronics, Inc. has ordered 50 Honeywell Information Systems, Inc. Level 6 minicomputers to be packaged with its Autotron programs for radio stations.

Systema Design & Development Corp. of Boulder, Colo., has installed one of the first IBM Series 1 minicomputers in the Rocky Mountain region. The firm is developing program products for marketing with the Series 1.

McDonnell Douglas Corp. has ordered 13 Syatems Engineering Laboratories SEL 32/55 systems to serve as the heart of the Air Combat Maneuvering Simulator Device 2E6, which has been designed for sharpening naval aviation aeronautical skills and developing combat strategy.

General Warehouse Corp. has ordered a Univac 90/30 system for order entry, inventory control and for control of warehousing and trucking operations.

Health Management Services, Inc. has ordered 100 Honeywell Level 6 minicomputers to provide DP services to hospitals and insurance operations in a distributed systems environment.

Houston Natural Gas Corp. has installed an Electronic Memories & Magnetics, Inc. 345 add-on memory to supplement its IBM 370/145 system.

The Internal Revenue Service has ordered 288 Burroughs Corp. on-line S1200 document encoders and related equipment to speed taxpayer remittance processing.

Avakian Systems Corp. has ordered 1,000 Micromind II microcomputer systems from ECD Corp.

The Westinghouse Corp. has ordered 45 Qantex Model 2200 dual-cartridge data storage systems which, using two 3M Co. Model DC300A data cartridges as tape to media, will each provide 5.7M bytes capacity for use as program storage in Westinghouse milling machines.

Raleighs, a Washington, D.C., fashion apparel chain, is installing NCR Corp. 2151 programmable retail terminals in its 10 stores.

The U.S. Navy has ordered five MK 86 shipboard weapon control systems from Lockheed Electronics Co., Inc.

The Greater Cleveland Regional Transit Authority has ordered a Basic/Four Corp. system for scheduling and management control of its Community Response Transit operations. Computer/Dynamics, Inc. of Cleveland will design and install the system.

The State University of New York at Buffalo has installed a Control Data Corp. Cyber 173 to replace the CDC 6400 it has been using for eight years.

SI Aiming More at End Users

By Eather Surden
Of the CW Staff

SUNNYVALE, Calif. – System Industries (SI) is finding itself more and more in the end-user marketplace with its Digital Equipment Corp.- and Data General Corp.-compatible disk systems, according to Kent Winton, vice-president of marketing for the firm.

Previously, the firm had not pitched to the end user who needed support, Winton indicated. But "over the last two years we've built up our service capability and can keep up" with end-user needs, he said.

SI now has service centers in New York, Cincinnati, Chicago, Toronto, San Francisco, Los Angeles and Orlando, Fla., staffed by about 20 people trained on what Winton described as the company's "simplex product line."

That way the service people are specialists and can effectively deal with the product maintenance rather than generalists who must know many products, he said.

The company recently slashed prices on its disk products by about 15%, Winton noted, because of a new contract SI signed with Control Data Corp. The contract allows the firm to pass significant savings on to the user, he added.

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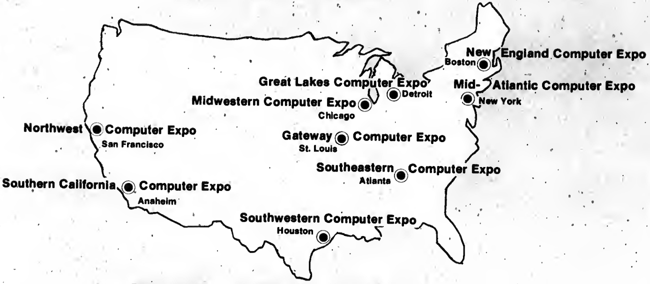

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TI Sees Bubbles Good Mass Memory — But Not for the Masses Until '80s

By Toni Wiseman
Of the CW Staff

DALLAS — Bubble memories are no longer a laboratory fantasy; they are a commercial reality since the introduction of Texas Instruments' TI 765 teleprinter that uses bubble technology for mass memory storage [CW, April 25].

But even TI admits bubbles will not be a major force in the storage market before the early 1980s because of the current high costs.

Bubble memory will impact two separate markets, the replacement market and the microperipherals market, according to Dr. Michael H. Valek, manager of the Magnetic Bubbles and Semiconductor Group.

Magnetic bubble memory (MBM) will undergo an 80% price reduction as a result of learning curves in terms of processing and packaging in the near future. By 1980, MBM will be able to compete on a price basis with all floppies and a large percentage of the fixed-head segment, Valek predicted.

MBM has a lower access time, simpler interface and is less expensive than moving-head disks, but it is not removable and has a lower transfer rate and a higher price per bit. The same advantages and disadvantages hold true for floppy disks, Valek said.

Compared with MOS random-access memory (RAM), MBM's advantages include nonvolatility, a greater density and a lower bit price. MOS RAM, however, offers lower access times and transfer rates and simpler interface.

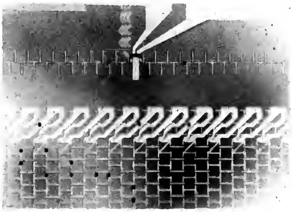
Finally, compared with charge-coupled devices (CCD), MBM offers nonvolatility and greater packing density, but again a higher access time and lower transfer rate.

Ideal Applications

This means that bubbles are ideally suited to serial auxiliary memory applications where nonvolatility is essential, whereas CCDs are better suited to virtual memory applications where there is a need for high performance but volatility is tolerable, Valek said.

The two technologies will never overlap in terms of applications, he noted, so companies which are ignoring one in favor of the other are missing out on the chance of a huge market.

MBM is highly microprocessor-compatible, Valek indicated. It offers small size (1M bit in 20 cubic inches); modularity (100K-bit increments); low entry price; compatible packaging (single PC board); simple, low-cost interfacing (an LSI custom interface will be available in the fourth quarter); and a low transfer rate (50 kbit/sec).


TI Bubble Memory

MBM is also nonvolatile, has an access time of a few milliseconds, has low power dissipation and can be removable, but at a high cost, Valek said.

TI is currently offering the PC board, bubble memory and custom MOS controller. The board and bubble sell for $250, the prototype controller for $150.

TI put an appreciable amount of money into producing a viable commercial product — some industry figures have estimated $7 million of the company's own funds in addition to $3 million in government grants.

Valek noted that the multichip approach which has been used by firms such as Rockwell International for military applications gives a density advantage, but has severe cost problems which essentially make it difficult to implement in a low-cost/high-production mode.

"All the chips have to be magnetically matched, which is not consistent with high-volume production because rework is extremely difficult," he said. "Also, a single chip package is much more flexible."

The most exciting applications for MBM will be in areas where it will permit users to do things which are simply impossible today, Valek said, because the cost or size of using a disk drive is prohibitive. These include applications in intelligent terminals, point-of-sale devices and programmable calculators.

Microcomputers with MBM will have the availability of low-cost mass storage, he said, noting the price of MBM should drop to 10 millicent/bit by 1980.

By 1980, the MBM market should grow to more than $100 million annually. "But the requirements for computer memory are increasing drastically and will continue to do so through 1985. So the other media will not go out of business and will continue to grow as well and will remain competitors," Valek stated.

"But an appreciable part of those requirements will be served by bubbles and CCDs," he added.

Fiche Credited With COM Growth

DALLAS — Acceptance of microfiche is a primary reason that computer output microfilm (COM) is the fastest growing segment of the micrographics industry, the president and board chairman of Quantor Corp. recently told members of the Dallas-Fort Worth area financial community.

Charles Askanas noted that fiche — rectangular sheets of microfilm, 4- by 6 inches in size — has been accepted by the DP industry as the "optimum medium for recording data on film."

$403 Million Sales

According to Askanas, COM is easily the fastest growing segment of the micrographics industry, with worldwide sales of $403 million during 1976. The COM world market is expected to top $1 billion in sales in 1980, he added.

Calling COM "a segment of the DP industry," he said it benefits DP users in five ways: reduced cost, rapid information storage and retrieval, speed of computer output, ease of handling and storage and ease of distribution.

Fiche Acceptance

Fiche, he added, has achieved acceptance in the industry because it provides "an ideal unitized record, ease of duplication and ease of operation and implementation of the display" of information.

In Askanas' view, film and magnetic media (tape and disk, for example) "are very similar: data in an emulsion on a polyester-based material. However, fiche is currently way beyond the state of the magnetic art in recording density."

Fiche, which can be produced in a variety of densities, provides two to 125 times the density of magnetic media, he pointed out.

Executive Corner

IBM Names Haddad To New Vice-Presidency

ARMONK, N.Y. — IBM has made several executive changes and formed a corporate technical personnel development staff.

Jerrier A. Haddad was named to the new post of IBM vice-president, technical personnel development, and will head a staff to promote engineering, programming, technology and scientific community leadership as well as enhance the exchange of technical information between IBM's labs and business units.

Bob O. Evans will succeed Haddad as vice-president of engineering, programming and technology.

Allen J. Krowe succeeds Evans as president of the System Communications Division and Victor J. Goldberg has been appointed IBM director of business plans.

Other Moves

- E. Russell Eggers, president of Loctite Corp., and Horace G. McDonell Jr., senior vice-president of the Perkin-Elmer Corp., have been elected directors of Perkin-Elmer.
- Jess Hay has been elected to the board of directors and Charles D. Ettinger has been appointed vice-president of administration at Carterfone Communications Corp.
- Thurman F. Breen has been elected chairman of the board of Eastern States Bankcard Association.
- Donald B. Bruck has been elected chairman of the board of Hybrid Systems Corp.
- Wilfred J. Corrigan was elected chairman of the board of Fairchild Camera and Instrument Corp.
- Atlantic Research Corp., having recently become an independent company, has elected the following directors to its board: William H. Borten, Dr. Lawrence A. Goldmuntz, W. Gerald Hamm, Charles B. Henderson, Dr. Howard J. Laster, Dr. Coleman Raphael and Joseph S. Steinberg.
- Shareholders of Communication Satellite Corp. have elected two new directors, Howard J. Morgens and Charles J. Pilliod.
- L. Neil Williams Jr. has been elected to the board of directors of National Data Corp.
- Edward Bleckner Jr. has been appointed president of Milgo Electronic Corp.
- L.C. Whitney has been appointed president and chief operating officer of National Data Corp.; George W. Thorpe, chairman and chief executive officer; and John B. Elliott, chairman of the executive committee.

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Charges Contract Breach

Distributor Sues Cincom for $4.4 Million

By Molly Upton
Of the CW Staff

PHILADELPHIA — A $4.4 million suit charging breach of contract, unfair trade practices and slander has been filed here against Cincom Systems, Inc. by its former Brazilian distributor, Deltacom Sistemas de Informacao S/C Ltda.

The suit, filed in the District Court for the Eastern District of Pennsylvania, demands damages for loss of profits resulting from what it calls the improper termination of contract and for compensatory and punitive damages resulting from the alleged defamation of Deltacom's integrity in South America.

Deltacom seeks interests and costs in addition to the $4.4 million. Cincom declined to comment on the case.

The suit arose after Cincom cancelled its representation agreement with Deltacom in January 1976. The U.S. software vendor charged the Brazilian firm with failing to remit royalties on Cincom software sold in Brazil since May 1973, when the contract was signed.

International News

Wanted U.S. Dollars

Robert Malis, an attorney with the Philadelphia law firm of Malis, Tolson and Malis, said Cincom had wanted payment in U.S. dollars. However, the necessary approval by the Brazilian government was denied. Cincom then terminated the contract between the two firms [CW, June 28] after Deltacom had sold about $500,000 worth of software.

Cincom's installations in Brazil switched their maintenance contracts to the new Cincom representative, Sistemas Computacao e Informatica, and Cincom allegedly slandered Deltacom's reputation through letters and ads.

There had been other skirmishes between the two firms before Deltacom filed suit in Philadelphia.

Deltacom filed suit in the U.S. because it could not sue Cincom in Brazil since Cincom had no corporate entity established there, Malis said.

Cincom then tried to have the suit transferred to Brazil, but that petition was denied, he added.

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CARACAS, Venezuela — The Department of Commerce is sponsoring a major exhibition of U.S. advanced business equipment, computers and peripherals at the Edificio Thomas Alva Edison Exhibit Hall here, Dec.5-10.

The exhibit, Ofisistemas '77, is designed to take advantage of the trade opportunities Commerce has identified in Venezuela — a market expected to reach $140 million annually by 1979 at a growth rate of 28% per year.

Among the products Commerce has identified as having the highest sales potential are minicomputers, intelligent terminals, data entry systems, CRTs, microfilm and microfiche equipment, optical printers and readers, disk drives and packs, modems, software packages and word processing equipment.

Minicomputer sales, for instance, are expected to climb from $11 million in 1976 to $27 million in 1979, with U.S. suppliers retaining a 60% share of the market.

The U.S. is also expected to claim 60% of the data communications and remote terminal systems market in Venezuela, a market projected at $10 million for 1979.

Participation in Ofisistemas '77 is limited to 45 U.S. companies. Further information is available from Hans J. Amrhein, Room 4036, U.S. Department of Commerce, Domestic and International Business Administration, Washington, D.C. 20230.

DP Nurtures Tokyo's Traffic System

By Ivan Berenyi
Special to Computerworld

TOKYO — Rapid development of Tokyo's computerized traffic control system has led to its overtaking similar systems in New York and Toronto as the world's most advanced traffic system, according to Osamu Nakamura, chief of the Traffic Control Division of Tokyo's Metropolitan Police.

More than 2,900 traffic lights across 32 wards of the city center — an area of about 168 square km — are now under complete computer control, Nakamura said. The number has almost doubled in the last 12 months.

Computer analysis of traffic flow enables early action to be taken to defuse potential jams by reordering the sequence and duration of traffic-light changes.

The traffic flow data is gathered on-line from more than 3,200 ultrasonic vehicle detectors installed at roadsides throughout the city center.

More detailed information at peak-flow pressure points like the famous Ginza or Akasaka Mitsuke intersections comes from 19 closed-loop television cameras, phone calls from men on the beat, radio-equipped patrol cars and rush-hour helicopter surveys.

All the incoming data is analysed by a Nippon Electric Neac 2200 Model 375 computer with 524K-byte core capacity. An illuminated map of the city center shows in color codes the changing status of the city's traffic - white for good flow; orange for slowdown, red for full-scale jam. Visual display units give more detailed information, like the precise flow of traffic at any one intersection.

Control of the traffic lights is handled by six 64K Neac 3200 process control minis, communicating with the central processor through two 32K Neac 3100 front-ends.

"The system is being expanded every year in terms of the area covered, the number of computers intstalled, intersections controlled, vehicle sensors used and TV cameras mounted," says Nakamura.

The system is a merger of two former traffic services — the 10-year old Traffic Information Center, which used to gather data manually from policemen pushing buttons in police boxes to represent traffic flow, and the Computerized Signal System, set up in 1969, when the first Nippon Electric computer was installed.

The Traffic Information Center data was previously processed by two Technomaster control processors made by Matsushita Control Industrial Co. These have now been discarded.

The Matsushita 'Macc-7' computer complex, earlier dedicated to coordinate traffic lights along certain routes as a slave to the Computerized Signal System, was also phased out.

CDC, Yugoslav Firm Form Joint Program

MINNEAPOLIS — Control Data Corp. and Iskra ZP, of Ljubljana, Yugoslavia, have announced an agreement in principle covering a 10-year program of business and technical cooperation in the fields of computer-related technology and marketing.

The initial agreement sets forth a number of areas in which individual programs of cooperation will be pursued, including the design, development, production and marketing of minicomputer systems and the purchase of computer peripheral equipment.

Other areas of potential cooperation encompass the development and marketing of computer software appications programs, DP services and technology exchange in cooperation with CDC's Worldtech and Technotec services.

Foreign Orders & Installations

Imperial Oil Ltd. of Canada has ordered a Systems Technology Services Ltd. "minifuel" system to provide automated delivery, scheduling and accounting for customers of Imperial's Halifax home comfort centers.

Czechoslovakia's Ministry of Finance has ordered a Cognitronics Corp. System/70 optical character recognition system to be used for document processing at Kancelarske Stroje in Prague.

Atlasair, a UK-based international freight forwarding firm, has ordered an Altergo Computers Ltd. minicomputer system to be installed at Atlasair's main office at Feltham, next to Heathrow Airport.

Kienzle Apparate, GmbH, German producer of high-precision electronic instruments, has ordered 394 Beehive International terminals to be used in the European banking industry.

The Tokyo Sogo Bank has ordered a $10-million Burroughs Corp. B7700 system.

The Stichting Academisch Rekencentrum Amsterdam, a Dutch cooperative educational computing center, is installing a second Control Data Corp. system, a Cyber 173-8, to handle interactive time-sharing jobs.

Wardair, a Canadian charter airline, has ordered a Univac 1100/22 system valued at approximately $4 million.

British Airways has ordered a C8500 data communications system from the Collins Commercial Telecommunications Division of Rockwell International. Scheduled for installation at Heathrow Airport in the spring of 1978, the system will provide both high-speed data and low-speed telegraph message switching plus control functions.

Industridata AB, Sweden's second-largest service bureau, has ordered three Burroughs Corp. 86800 systems and three B876 systems and communications processors for use in its distributed DP network.

Compugraphics, European semiconductor maskmaking firm, plans to install an Electromask, Inc. Series 2500 combination pattern generator/image repeater at its Edinburgh, Scotland, plant in late summer.

W.Schlafhorst & Co., West German textile machinery manufacturer, has placed the first West German order for the Univac 90/80 system. The system will take over master planning, work order management, credit handling, purchasing and a personnel information system.

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- **5 plus years' experience in high level software system specifications and design with an understanding of system interface. Requires ability to coordinate and review multiorganization software efforts.**
- **5 plus years' experience in bidding, organizing, scheduling, tracking, and controlling software development efforts in a matrix organizational environment. Requires ability to parse work to functional organizations, prepare work authorizations, and control performance against those work authorizations.**

Ready to join a company committed to excellence? Then investigate these openings now and expect a good salary, great benefits package, warm year 'round weather, and opportunities for travel and field assignments. For immediate consideration, please forward your resume with salary history and requirements to Professional Employment, Dept. CW-154, P.O. Box 188, Mountain View, California 94042. An equal opportunity employer. Minorities and females encouraged to apply. U.S. citizenship is required

GTE SYLVANIA

GROUP INFORMATION SYSTEMS MANAGER

The world's largest independent producer of tape transports, and a manufacturer of various computer peripheral products for the OEM market has an immediate requirement for a seasoned Information Systems Manager. This position will be in the suburban West San Fernando Valley area of L.A.

The selected candidate will have total responsibility for developing, planning and implementation of all data processing and information systems at multiple site installations within the Microsystems and Peripherals Group; as well as responsibility to ensure economical use of EDP hardware and personnel. Heavy emphasis will be placed on analysis and evaluation of hardware and software requirements and the selection and installation of equipment configurations to support a distributed data processing environment.

If you have a strong business and technical orientation with 8 - 10 years direct EDP management experience, preferably in a manufacturing environment, you are invited to submit your resume in strict confidence to:

Gary Villella, Pertec Computer Corporation, 9610 DeSoto Avenue, Chatsworth, California 91311.

An Affirmative Action Employer M/F

PCC PERTEC
a division of Pertec Computer Corporation

Join the EDP

Advance your career with a leader

NCC INTERVIEWS

WORLD HEADQUARTERS – DAYTON, OHIO

COMPETITIVE PRODUCT ANALYST

Join our Corporate Market and Product Evaluation group and apply your expertise in this area.

To qualify, candidates will normally possess an applicable degree plus experience in operational software or application software as a Programmer or Systems Analyst. We prefer knowledge of DOS-VS-OS-Communications-MIS and data base; analytical, evaluative and interpretive skills; ability to reduce technical matter to decision-making form and communicate effectively; and the capability to practice EDP skills individually, as a team member, or project leader.

You will play an important role with a highly motivated professional group.

SYSTEMS ANALYSTS CORPORATE MIS

Our Corporate Management Information Systems organization is looking for people with 7 or more years business systems development and installation experience who wish to participate in major, multi-national information systems projects.

BS Business Administration, Accounting or Marketing preferred or equivalent work experience.

SOFTWARE QUALITY ANALYST

Our International Division has immediate openings for Software Quality Analysts who will be responsible for design and implementation of test activities on new software applications. We prefer an individual with a college degree in Business Administration / Engineering / Computer Science plus 4-6 years experience in EDP, especially applications programming. These positions require knowledge of COBOL and Assembler type languages.

PROGRAMMERS

Our International Financial Systems group is looking for Programmers with 2-4 years experience to develop international banking systems.

These positions offer challenge, broadening of career, work in the forefront of technology and the opportunity to progress rapidly into a position of project management.

To qualify you will currently be working in a banking or communications environment. We prefer experience with COBOL, systems analysis and design. Some positions require a knowledge of ledger or minicomputer applications systems.

NCC INTERVIEWS

To arrange for an interview at the NCC Show, Call Vernon Mirre at 513/449-2281 June 6 through June 10, 1-5 p.m. (EDST)

If you are unable to call, forward your resume along with salary requirements to:

Mr. Vernon L. Mirre
Corporate Executive & Professional Recruitment
NCR Corporation
Dayton, Ohio 45479

If you are a Systems Analyst, Programmer Analyst, or an EDP professional, we'd like to hear from you. Send your resume indicating geographic preference to Mrs. Marjorie L. Jones, Director, Corporate Executive & Professional Recruitment, NCR Corporation, Dayton, Ohio 45479.

DATA PROCESSING DIVISION – SAN DIEGO

San Diego, Calif.

PROGRAMMER/ ANALYSTS

NCR Data Processing Division has immediate openings for Programmer Analysts in:

- **MIS Applications**
- **Software Development**
- **Firmware**
- **Diagnostic Programming**
- **O/S Project Lead**

  (Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing)
- **Software Configuration Management**
  (Design, develop programs to support software testing, release and repair)

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange for an
NCC INTERVIEW
Call George Rice
214/748-8080

on Sunday, June 12 through Wednesday, June 15 or send resume immediately including salary history, training and experience to:

Mr. George Rice
Data Processing Division
NCR Corporation
16575 W. Bernardo Drive
San Diego, Calif. 92127

TERMINAL SYSTEMS DIVISION – CAMBRIDGE

Cambridge, Ohio

SR. SOFTWARE ENGINEERS

They will provide direction in the planning section of our Retail Systems Software organization, being responsible for interpreting systems specifications and developing operating systems, language, and diagnostic requirements for future retail systems.

Should be familiar with evaluating system software performance in a real-time processing environment. A degree and from 3-7 years applicable experience will round out your qualifications.

PROGRAMMER/ANALYSTS

To design, implement, document, and maintain assembly coded driver, interface and application modules for mini and microprocessor based retail point-of-sale terminal systems. Experience in assembly coded programming in a multi-tasking real-time executive based system or Intel 8080 or equivalent. BS in Engineering or Computer Science.

NCR's P.O.S. group is located in rural east central Ohio, offering a fine living and working environment.

We invite your response as soon as practical.

Robert W. Donovan
Terminal Systems Division-Cambridge
NCR Corporation
Box 728
Cambridge, Ohio 43725
614/439-0291

Professionals

Think of NCR as over 65,000 people, all involved — one way or another — with the processing of information. We're active. We research, invent, develop, manufacture, market and service many kinds of information products and systems; and we do it in all the major cities in the United States plus 120 foreign countries.

TERMINAL SYSTEMS DIVISION-ITHACA

Ithaca, N.Y.

PROGRAMMERS SYSTEMS ANALYSTS ENGINEERS

We are a world leader in the manufacture of microcomputer systems and you will be immediately caught up in challenging work at the outer edge of the state-of-the-art. This includes exposure to microprocessor technology and the relatively rare opportunity to develop skills with a growing professional staff.

We are located near Cornell University in one of the loveliest cities in the beautiful Finger Lakes area where living is an exciting experience equally rich in educational and recreational opportunities. We will assist in relocation, if hired.

We are seeking applications from people with the following experience:

- **Digital Electronics Design: Microprocessors, LSI, TTL and machine language programming**
- **Communications: Networks and SDLC, bisynch, asynch disciplines**
- **Operating Systems Design and Implementation**
- **Applications: Data Entry/Data Inquiry Systems, Distributed Processing**

BS Computer Science or Electrical Engineering and 1-7 years experience required.

We offer an outstanding compensation and benefit package — let us hear from you. Send resume and salary requirements in confidence to:

Mr. M. A. Friedenberg
Professional Placement
Terminal Systems Division-Ithaca
NCR Corporation
950 Danby Road
Ithaca, N. Y. 14850

TERMINAL SYSTEMS DIVISION-MILLSBORO

Millsboro, Delaware

Grow with the Pioneer of POS Terminals!

NCR's Terminal Systems Division in Millsboro, Delaware has unparalleled career opportunities for individuals interested in advancing state-of-the-art in POS terminals.

SYSTEMS PROGRAMMER/ENGINEER

Experience with DEC PDP 11/35 or higher level computers required.

Requires a background in minicomputer or microprocessor systems and/or associated application programming.

SYSTEMS I/O-F/W PROGRAMMER

Requires experience in general purpose applications minicomputer programming of peripheral devices, at the assembler level.

Responsibilities will include the definition and supervision of coding of applications oriented F/W to interface POS terminal peripherals to the base ECR.

DIAGNOSTIC ENGINEER/PROGRAMMER

Requires an engineer or hardware-minded programmer with minicomputer programming experience and a flair for the challenge of diagnostic test software.

COMMUNICATIONS F/W PROGRAMMER

Requires experience in data communications minicomputer programming at the assembler level.

Experience with RJE-type communications and synchronous protocols preferred. Knowledge of SDLC fundamentals a plus.

MANUFACTURING SYSTEMS ANALYST

On-line inventory control, WIP, MRP and financial systems experience in a manufacturing environment.

Will design advanced EDP systems in the areas of material and production control as well as financial applications.

Programming knowledge required; prefer COBOL, Assembler, or NEAT/3 experience as well as data base (particularly TOTAL).

All positions require a BS in EE, CS, Math or related discipline.

In addition to an unparalleled career opportunity within NCR, our Millsboro location offers comfortable living in a scenic and uncongested coastal area. The finest marine recreational areas, wildlife preserves, and beaches are within minutes of our Millsboro facility.

If success interests you, please send your resume to:

Mr. Ron Tull, Dept. CW-66
Terminal Systems Division-Millsboro
NCR Corporation
P.O. Box 607
Millsboro, Delaware 19966

DATA PROCESSING DIVISION-WICHITA

Wichita, Kansas

Computer Professionals... You'll like NCR-Wichita.

We provide a state-df-the-art challenge in realtime architecture, develop network design and communication control for distributive processing in a revolutionary data processing minicomputer environment. Here you are given the chance to create and are treated as the unique individual you are.

Professional development is encouraged through a tuition-refund plan for academic work toward approved graduate and undergraduate degrees at accredited colleges and universities in the area.

You will enjoy some of America's finest living in addition to excellent working conditions. Some of our opportunities are:

Compiler Design Programmers

Serve as a team member for design development documentation testing and enhancing of large compilers.

Minicomputer Operating Systems

Responsible as a team member for design, implementation and testing of interactive general purpose operating systems to support COBOL applications and utilities, written and assembly language.

Diagnostic Design & Programmers

Design, modification and support of diagnostic programs to provide for testing on new mini/micro processor based hardware systems.

WE'RE WORTH AN EXTRA-SPECIAL LOOK...

Get in touch today By Phone: 316/687-6192
By Resume: Mr. Jerry Long, Professional Placement Office, Dept. AB,
3718 North Rock Road, Wichita, Kansas 67226.
You'll get complete details either way.

An Equal Opportunity Employer

SYSTEMEDIA DIVISION

Miamisburg, Ohio

PROGRAMMER/ANALYSTS

These positions offer an opportunity to pursue your development goals in the EDP field. A degree plus experience as a Programmer/Systems Analyst is required. Background in accounting applications and with an NCR Century 200 system would be helpful.

At our Systemedia Division location (south of Dayton, Ohio) you will find an atmosphere conducive to the development of your professional goals. This area is the home of about three-quarters of a million people who enjoy the best of a progressive midwestern city. Housing is moderately priced and not difficult to find. Schools are good, and institutions of higher learning provide many opportunities to add to your education. Send resume to:

G. W. Fridenmaker
Systemedia Division
NCR Corporation
9095 Washington Church Road
Miamisburg, Ohio 45342

NCR
Complete Computer Systems

PROGRAMMER/ANALYSTS

Major advertising agency located in beautiful north Datroit suburb. DOS/VS. on a 1 meg S/370-138, 3344's, COBOL, and some PL/1. Five mini's installad throughout the U.S. This is a ground floor opportunity for a sharp, aggressive individual in a small, eight person department.

Private offices, creative atmosphere, and a dynamic environment. Minimum 1 yaar experiance.

Send resume to: Mr. Dennis Bartt
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Woodward at Long Lake Road
Bloomfield Hills, MI 48013

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field engineering

A Very Good Year for Us. A Better One for You?

Most computer professionals are aware that today's most advanced large-system technology was developed by a company that, not too long ago, was virtually unknown.

Now the phenomenon is widely known. Amdahl's 470V/6 performs as promised. And the company performs as promised: our hardware and software support exceeds the established standards.

Not well known, however, is that this major supplier of large systems is still, in terms of staff size, relatively small. At Amdahl, you're not lost in a sea of people: we began 1976 with less than 400 people and ended it with less than 800. There's still room on the ground floor.

We're looking for above-average talent. You can expect an above-average compensation and benefits package. Please direct your response to Employment Manager, Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. We are, nf cnurse, an equal opportunity employer.

Immediate openings throughout the U.S. and Canada. Field candidates will undergo a training period in California on full salary with housing, transportation, and other expenses provided.

FIELD ENGINEERING SPECIALISTS

You will have a minimum of 5 years' experience in maintaining large-scale systems with in-depth training on compatible CPUs. You will have company support in assisting the Amdahl customer in his mixed-vendor environment to maintain full operations in his center. Openings in several major cities and at Amdahl headquarters in California. Please indicate 560-E on your respnnse.

FIELD ENGINEERS

You will carry the Amdahl philosophy of customer service as well as your expertise into the field, utilizing your initiative and talents to aid the customer in restoring computer center operations regardless of the origin of the failure. Large system experience essential, preferably on compatible equipment. Please indicate 567-3E on your response and direct it to the Amdahl regional office nearest you as shown below.

Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, California 94086

Amdahl Corporation
680 Fifth Avenue
New Ynrk, New York 10019

Amdahl Corporation
2021 Spring Road
Oak Brook, Illinois 60521

Amdahl Corporation
22150 Greenfield Road
Oak Park, Michigan 48237

Amdahl Corporation
5454 Wisconsin Avenue, Suite 1535
Chevy Chase, Maryland 20015

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COMPUTER SCIENCE FACULTY

Visiting: teaching position in undergraduate computer science and information systems curriculum (Sperry, Systems analysis, O.R., numerical analysis, non-numeric processing, computer architecture). Doctorate preferred, Master's considered. Rank and salary dependent upon qualifications. To begin fall semester (Potsdam is located in St. Lawrence Valley, north of the Adirondack Mountains). Apply with credentials to:

Dr. J.F. Dalphin, S.U.N.Y.
Box 820
Potsdam, N.Y. 13678

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EDP AUDITOR

California

Immediate opening for candidate with formal educational background in accounting or computer science and a minimum of 1 to 2 years bank auditing experience. Needed are excellent written and oral communicative skills

Please send your resume and salary history in confidence to **Linda R. Masi, Employment Division 2-53, 611 No. Brand Blvd., Glendale, CA 91203.**

SECURITY PACIFIC BANK
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Chevron

SYSTEMS PROGRAMMER ANALYST

Career opportunity with a major oil company in Houston for an individual with the following qualifications:

- **Several years of assembly language coding experience**
- **Some large scala IBM SCP experience including systems generation, PTF application, etc.**
- **Additional experience in MVS, JES2, TSO Taleprocessing, interactive graphics desirable**
- **BS Degree in tachnical field prafarred**

For immediate consideration, send resume, salary requirements and college transcripts to:

PERSONNEL MANAGER
P.O. Box 36487
Houston, Texas 77036
An Equal Opportunity Employer
Dedicated to Affirmative Action

H-6000 SYSTEMS AND SOFTWARE PEOPLE

Exciting opportunity to join Control Data's OEM Mass Data Systems Software Development Group. This product is a major new development in computer industry.

GCOS SYSTEMS PROGRAMMER

We are looking for a GCOS Systems Programmer with wide experience in data processing. The ideal candidate will be able to write and implement SSA modules utilizing GMAP, interpret master mode core dumps and be familiar with COBOL and the file system.

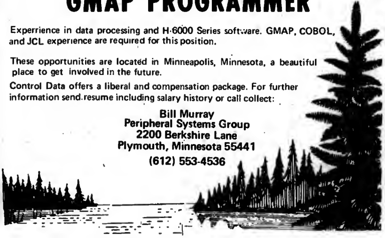
H-6000 SERIES GMAP PROGRAMMER

Experrience in data processing and H-6000 Series software. GMAP, COBOL, and JCL experience are required for this position.

These opportunities are located in Minneapolis, Minnesota, a beautiful place to get involved in the future.

Control Data offers a liberal and compensation package. For further information send resume including salary history or call collect:

Bill Murray
Peripheral Systems Group
2200 Berkshire Lane
Plymouth, Minnesota 55441
(612) 553-4536



CONTROL DATA CORPORATION

An Affirmative Action Employer M/F

Financial Service Marketing Representative

CBT Data Services, a wholly owned subsidiary of CBT is seeking an experienced salesperson to market EDP financial services.

The individual we seek will be responsible for expanding and developing commercial EDP services in Connecticut. These services include payroll, accounts payable and receivable, inventory control, and general ledger. 2-5 years experience in data processing sales or a directly related field is required.

Please submit resume, which includes salary history and expectations to Steven Bell, Manager, Professional Recruitment.

The Connecticut Bank and Trust Company
1 Constitution Plaza, Hartford, Connecticut 06115
an equal opportunity employer m/f

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make milgo your future

TECHNICAL WRITERS

SOUTH FLORIDA

Milgo Electronic Corporation has opportunities available for technical writers with 1-5 years experience The ability to read and interpret digital and electronic logic/schematic diagrams and a good understanding of microprocessor systems are required. Responsibilities will include writing technical (electronic) and software (user and application programmer) manuals.

The successful candidates will be aggressive self-starters looking for fast professional growth in the technical communications field. Associate degree or Bachelors degree in engineering or journalism is a plus, but demonstrated ability to describe complex electronics circuits and/or software programs clearly and concisely will win the job.

Milgo offers excellent salaries, complete company benefits, and a relocation allowance as well as the benefits of South Florida living. To arrange for your interview, send your resume in complete confidence or call Dan Haynes at (305) 592-8600 collect.

Milgo Electronic Corporation
8600 N.W. 41st Street Miami, Fla. 33166
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Bethesda, Maryland 20014
(301) 654-9225

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Minneapolis, Minnesota 55416
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Los Altos, California 94022
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Rochester, New York 14604
(716) 454-3888

WELCOME BOSTON CARAVAN '77! IMMEDIATE INTERVIEWS

VISIT HOLIDAY INN, HOSPITALITY SUITE, Route 128
EXIT #38 Washington Street, Suite 106-108
June 6, 7, 8, 9 - Time 9 am.-9 p.m.

WE ARE BEING RETAINED TO RECRUIT FOR THE FOLLOWING POSITIONS:

Graphics Systems Development

The Company: Graphics Product Division of a $200 million company.

The Position: Individuals hired will be involved in a variety of software systems centered around mini and micro processors. Within the next year, systems will be designed and programmed for specific need and serve real-time, multi-user, multi-task interactive software projects. Assembly/Micro coding experience required.

Compensation: Low Twenties

Senior Assembly Language Analysts

The Company: A major control oriented manufacturer.

The Positions: Two senior level contributors and one project leader are needed to contribute to the growth of this mini/micro based company. They have been a pioneer in utilizing relay ladder logic in their systems. Minimum of two years assembler programming required. Micro technology software preferred, but not required.

Compensation: 17K - 28K. Excellent fringes including dental

Manager Data Processing

The Company: Capital equipment manufacturing company, $15-20 million volume.

The Position: S/370 environment. Currently under utilized, looking to go database/Distributed processing to all user departments. Immediate need in MRP. Demonstrated systems development in manufacturing/financial as well as demonstrated management experience required. Excellent verbal and written skills essential along with a B.S., MBA strongly preferred.

Compensation: $25,000 Salary plus excellent fringes, tuition, relocation.

Programmer/Analysts

The Company: $900 million Retail/Distribution Company

The Position: Dual S/370's with CICS supported by COBOL/BAL. Highly motivated individuals needed to develop and support accounting, warehousing and merchandising applications. The ability to define and design user problems is vitally important. Excellent visability exists for management responsibility.

Compensation: 15K - 20K

Applications Analyst Programmer

The Company: Management consulting firm with offices located in most major Eastern United States cities.

The Positions: Require aggressive articulate people who are suited for project management/user interface. Areas of involvement include: Structured Design/Programming, Database (IMS, IDS, TOTAL) and Vendor Supplied Communications Software (CICS). Background should include 2-5 years COBOL S/360/370, Sys/3 or DEC minis. The ability to work independently is important.

Compensation: Mid-Upper Teens, Excellent Visability.

R&D Computer Scientist

The Company: R&D Division of a major high technology conglomerate.

The Position: Will perform applied research in the area of distributed database systems. Will investigate strategies for supporting data access transparency and multiple copy synchronization. Will explore methods for distributing control functions, develop performance and cost models and consult to operating divisions. Experience should include database systems, operating systems and programming languages. Education BS/MS or Ph.D. Computer Science ideal.

Compensation: Mid-High-Twenties

VISIT MAS BURLINGTON OFFICE OR CALL 273-1740
Directions: 128 Exit #42N to Burlington Mall-3rd set of lights take right-Lexington Street Mall Road, 1/4 mile on right, Entrance to New England Executive Park, Bldg. #15 June 6, 7, 8, 9 - Time 9 a.m.-9 p.m.

If you are unable to attend,
Please call or submit your resume
ADDITIONAL OPPORTUNITIES EXIST LOCALLY/NATIONALLY
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*Network Software
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MAS **Management Advisory Services, Inc.**
15 New England Executive Park, Burlington, Mass. 01803
(617) 273-1740

All fees/relocation assumed by our client companies. Our clients are equal opportunity employers.

MANAGER SYSTEMS AND PROGRAMMING

We have a growth situation for an experienced project manager with an interest in management. This position requires proven ability normally gained through four years experience in systems design, programming project organization and problem solving. Additional knowledge of IBM hardware and software is also necessary (ideally in a medical environment). Send complete resume including salary history.

Personnel Department
MEDICAL COLLEGE OF WISCONSIN
561 N. 15th St.
Milwaukee, WI 53233.

Systems Programmers

As one of the midwest's leading multi-divisional management consulting and systems integration organizations, our steady growth requires top professionals in the following areas:

* IBM 370: Systems Software, CICS, COBOL, PL/1
*BURROUGHS: B4700 and B6700
*HONEYWELL: COBOL, Fortran
*Real-Time Programmers: Experienced in minicomputers.

Top salaries, fully-paid fringes including life, health and dental insurances, moving allowance and educational benefits. Call or send your resume to:

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DATA BASE ADMINISTRATORS SYSTEMS PROGRAMMERS

Major New Jersey university currently involved in the development and implementation of large scale administrative systems under IMS has the following positions available:

DATA BASE ADMINISTRATORS (2)

Requires Bachelor's Degree or equivalent and 3 years programming and systems experience with large scale systems, OS JCL, COBOL, assembler and a minimum of 1 year of experience as a Data Base Administrator in an IMS DB/DC environment and recent IMS training.

SYSTEMS PROGRAMMERS (2)

Requires Bachelor's Degree or equivalent and 3-4 years experience as an applications or systems programmer with a minimum of 2 years systems programming experience. Strong knowledge of OS MVT, SVS, MVS, assembler and IMS internals. COBOL and conversion experience helpful.

Liberal fringe benefits

Qualified applicants forward complete resume, in confidence indicating position and salary requirements to:

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Newton, Mass. 02160
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Affirmative Action Employer M/F

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One of the leaders in the development of newspaper composition and electronic typesetting systems, offering you an excellent career opportunity . . . and a wonderful career climate in Melbourne, Florida.

SYSTEMS ENGINEER

We have an immediate career opportunity for the individual with EE degree or computer science background and 8 to 10 years experience in handling in-depth analysis of multiuser, real-time interactive digital systems. This position also requires your ability to evaluate hardware/software trade offs and a strong background in digital systems design with emphasis on multiple terminals and multiple processors communicative via software operation systems to large data bases.

We offer you an excellent income commensurate with your experience, a comprehensive benefits program and both professional and personal growth potential in a comfortable year-round location.

We will be scheduling interviews to be held in Dallas, Texas during the National Computer Conference, June 13-16. Call now (collect) for interview appointment or send resume to Mr. J.E. Jensen, Harris Composition, Systems Division, P.O. Box 2080, Melbourne, Florida 32901. (305) 259-2900.

HARRIS
COMMUNICATIONS AND INFORMATION HANDLING

An Equal Opportunity Employer Male and Female

Academic Systems Manager

Loyola University, New Orleans, seeks an Academic Systems Manager. Job functions are: Manage academic computing activity in an interactive computational environment; educate and encourage faculty in computer usage; perform all systems programming functions for academic activities; generate, optimize, maintain, and, if necessary, modify academic operating systems; acquire and adapt desirable application software; produce and maintain complete on line documentation for all application software systems; teach one three credit-hour course each semester in an area demanding computer usage. Prerequisites: Master's degree or equivalent; three to five years experience in activities in which computing was the major component; experience in a broad base of computer application areas (e.g., scientific computing, statistics, data processing, systems software, CAI, etc.). Starting date open. Salary negotiable based on credentials and experience. Applications should be sent to Dr. John Meredith, Chairman, Search Committee, College of Business Administration, Loyola University, New Orleans, La. 70118. Loyola University is an Equal Opportunity and Affirmative Action Employer.

EDP SPECIALISTS

Nationwide

• CORP DIR MIS NYC location	To $40M
• INTERNAL CONSULTING Chicago location, major co	To $45M
• MGR METHD & PROCED Texas location	To $30M
• SYS ANAL MRP Upstate NY location	To $23M

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The ROMAC DIFFERENCE

A Local Call Goes A Long Distance

Call or visit the Romac office nearest you, and make contact with our expert personnel consultants. Experienced executives constantly in-touch with key executives and top management in EDP, Accounting and Banking.

Your local call gives you access to Romac offices in 12 major eastern cities. You're not restricted to searching your immediate area. You have access to the best openings, in your industry as well as the best professionals available. All that for just a local call. That's the Romac Difference.

ROMAC
& ASSOCIATES/
Personnel Consultants

Contact Romac & Associates, A L Lamay President, 2 Sun Life Executive Park, Wellesley Hills, MA 02181 for transmission to our Partners in Atlanta, Boston, Buffalo, Charlotte, Hartford, New Haven, New York, Portland, Rhode Island, Rochester/Syracuse, Stamford

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SENIOR SYSTEMS PROGRAMMER

OLIN Has the Environment You Want, to perform at your best and to grow professionally.

OLIN, a large and successful technical company, has scored an impressive growth record. Our Chemicals Group, largest within Olin, has sales exceeding half-a-billion, and steadily climbing. And Olin, as you might expect has always emphasized Systems and advanced computer-based management approaches. Finally, add our convenient location and beautiful facilities. It all adds up to an opportunity for solid, rewarding career progress.

At least 5 years' experience is needed in systems programming, with knowledge of BAL, JCL, OS/VS utilities and OS/VS internals essential. Teleprocessing background and VSAM experience will each be a plus. A broad systems programming foundation is needed, including ability to analyze dumps and to assist COBOL programmers. You'll be working with 170/158 MVS, 3 megabytes.

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DALLAS INTERVIEWS — JUNE 13-16
To arrange a local Dallas interview and get all the details on a career with Intel, call Ed Haynes at (214) 241-9521 on June 13-16 from 9AM to 6PM.

District Manager Systems Sales

We need Field Sales Managers capable of motivating and directing the efforts of direct sales personnel and manufacturers' reps in the OEM microcomputer and memory systems marketplace. Requires 5-7 years experience in sales and sales management in microcomputers or related field.

LSI Field Sales Engineers

Experienced field sales engineers with proven ability to penetrate new markets and develop existing accounts for memory and microcomputer semiconductor components. 3-5 years sales experience in the semiconductor industry preferable.

LSI Field Application Engineers
(Microprocessor Components)

Will provide technical support to our direct field sales, manufacturers' reps and customers with application information on Intel microprocessors. Strong background in microprocessor hardware and programming required.

Systems Field Sales

Experienced field sales engineers with demonstrated ability to penetrate new markets and develop OEM microcomputer and memory systems accounts. Requires 3-5 years sales experience in related field.

Field Application Engineers (Systems)

These applications engineers will provide technical support to our direct field sales, manufacturers' reps and customers with application information on Intel microcomputer systems.

Marketing & Applications Engineers.

You may qualify for one of the positions listed below if you have a BSEE (MSEE and MBA preferred) plus appropriate background. Based at our Santa Clara, California, headquarters, you'll enjoy life on the San Francisco Peninsula, often called the most livable place on earth. Specific opportunities include:

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Senior Applications Engineer

You will be responsible for generating technical information via application notes and articles on Intel's dynamic RAM memory components. Involves strong technical interface and assistance with customers using Intel products and periodically conducting memory systems design seminars as lecturer. Requires 4-8 years experience.

If you won't be able to call, please send your resume, including salary history, in confidence to Intel Employment, Attn: Ed Haynes, 3065 Bowers Avenue, Santa Clara, CA 95051. An equal opportunity employer m/f.

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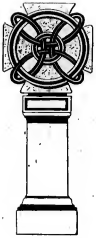

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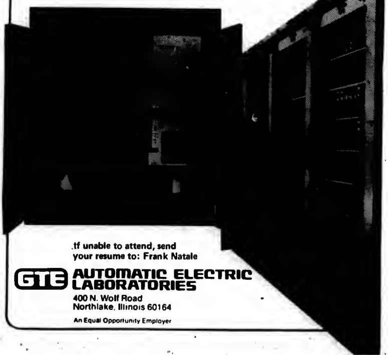

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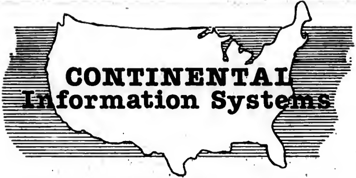

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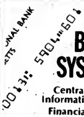

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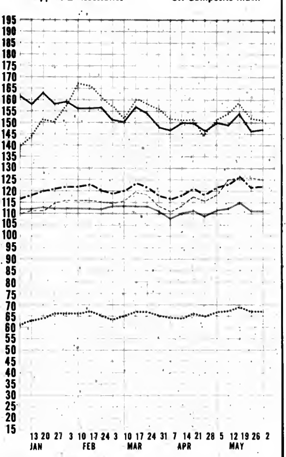

Earnings Reports

COMPUGRAPHIC

Three Months Ended April 2

	1977	1676
Shr Ernd	$1.05	$.95
Revenue	31,786,000	22,590,000
Earnings	2,421,000	1,840,000
0 Mo Shr	2.04	1.79
Revenue	00,948,000	44,220,000
Eernings	4,857,000	3,441,000

FOUR-PHASE SYSTEMS

Three Months Ended March 31

	1977	1976
Shr Ernd	$.60	$1.30
Revenue	18,798,000	14,690,000
Tax Cred	735,000	619,000
Eerninge	2,334,000	1,490,000

MOTOROLA

Three Months Ended March 31

	1977	1976
Shr Ernd	$.80	$.60
Revenue	409,801,000	346,996,000
Eernings	22,010,000	10,090,000

NATIONAL CSS

Year Ended Feb 28

	1977	1976
Shr Ernd	$2.81	$1.95
Revenue	41,703,000	35,803,000
Eernings	3,222,000	2,101,000
3 Mo Shr	.73	54
Revenue	10,663,000	9,314,000
Eernings	844,000	620,000

QUOTRON SYSTEMS

Three Months Ended March 31

	1977	1976
Shr Ernd	$.28	$.37
Revenue	7,383,625	6,315,258
Tex Cred	493,765	610,248
Eernings	901,024	1,151,722

SHARED MEDICAL SYSTEMS

Three Months Ended March 31

	1977	1976
Shr Ernd	$.53	$.39
Revenue	10,313,631	6,404,050
Eernings	1,549,793	990,935

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 1, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977 RANGE (1)	CLOSE JUNE 1 1977	NEEX NET CHNGE	NEER PCT CHNGE
O	AMOAHL CORP	0- 39	22 1/4	- 1/4	-1.1
N	OURROUGHS CORP	55- 91	57 1/8	- 7/8	-1.5
O	COMPUTER AUTONATION	18- 27	26 7/8	+1 5/8	+6.4
N	CCNTROL OATA CORP	20- 26	20	- 1/2	-2.4
N	OATA GENERAL CORP	35- 46	40 1/2	+1 1/4	+3.1
N	DATAPOINT CORP	18- 30	20 7/8	- 7/8	-4.0
N	OIGITAL EQUIPMENT	37- 53	41 1/2	+1 1/4	+3.1
N	ELECTRONIC ASSOC.	2- 3	1 7/8	+ 1/8	+7.1
A	ELECTRONIC ENGINEER.	8- 10	7 3/4	- 1/4	-3.1
O	POUR-PHASE SYSTEMS	14- 17	13 3/8	0	0.0
N	FOXBORO	42- 54	50 1/8	- 1/4	-0.4
O	GENERAL AUTOMATION	6- 9	6	0	0.0
O	GRI COMPUTER CORP	1- 1	3/4	0	0.0
N	HEWLETT-PACRARD CO	69- 87	74	- 1/8	-0.1
N	HONEYWELL INC	44- 55	50 1/8	+ 7/8	+1.7
N	IBM	243-286	248	+ 7/8	+0.3
O	MANAGEMENT ASSIST	5- 9	4 3/4	- 1/8	-2.5
O	MEMOREX	23- 29	24	+1 1/4	+5.4
O	MICRODATA CORP	7- 18	8 1/2	+ 1/4	+3.0
O	MODULAR COMPUTER SYS	5- 8	6 7/8	0	0.0
N	NCR	32- 38	34 3/8	+ 1/8	+0.3
O	PRIME COMPUTER INC	12- 17	14 3/8	+ 5/8	+4.5
N	PERRIN-ELMER	17- 21	16 7/8	-1	-5.5
N	RAYTHEON CO	55- 65	A3 3/4	+ 3/4	+1.1
N	SPERRY RANO	34- 42	34 3/8	- 1/2	-1.4
O	SYCOR INC	8- 15	8 1/2	- 1/8	-1.4
A	SYSTEMS END. LABS	5- 7	6	+ 1/8	+2.1
N	VARIAN ASSOCIATES	15- 20	19 1/8	+ 1/4	+1.3
A	WANG LABS.	14- 18	14 3/4	+ 1/8	+0.8

LEASING COMPANIES

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	NEEX NET CHNGE	NEER PCT CHNGE
O	BOOTHE COURIER CORP	8- 10	7 7/8	- 1/4	-3.0
O	COMOISCO INC	10- 13	9 3/4	- 1/2	-4.8
A	COMMERCE OROUP CORP	2- 2	2	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	7/8	0	0.0
N	OATRONIC RENTAL	1- 2	1	0	0.0
A	DCL INC	1- 2	2 1/8	+ 1/2	+30.7
N	OPP INC	6- 8	6 5/8	0	0.0
N	ITEL	13- 16	13 5/8	0	0.0
N	LEASCO CORP	19- 24	21	+ 3/8	+1.8
O	LEASPAC CORP	1- 1	1/2	- 1/4	-33.3
O	NRG INC	0- 0	1/8	0	0.0
A	PIONEER TER CORP	7- 11	6 1/2	- 1/8	-1.8
N	U.S. LEASING	10- 13	11 3/8	+ 1/8	+1.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

EXCH		PRICE 1977 RANGE (1)	CLOSE JUNE 1 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	1- 2	1 1/4	0	0.0
O	ANACOMP INC	7- 9	8 7/8	- 1/8	-1.3
A	APPLIEO OATA RES.	5- 7	7	0	0.0
N	AUTOMATIC OATA PROC	23- 30	24 7/8	-1	-3.8
O	COLEMAN AMERICAN COS	2- 2	1 3/4	+ 1/8	+7.6
O	COMPU-SERV NETWORK	10- 13	12	- 1/4	-2.0
O	COMP ELECTION SYSTMS	A- 9	8 3/8	+ 3/8	+4.5
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
O	COMPUTER NETWORR	6- 7	6 1/8	- 1/2	-7.5
N	COMPUTER SCIENCES	7- 9	7 3/8	- 1/8	-1.6
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	2- 3	1 3/4	- 1/8	-6.6
O	CONSHARE	5- 7	5 1/4	0	0.0
O	OATA OIMENSIONS INC	4- 3	4	- 1/4	-5.8
O	OATATAB	1- 2	2	- 1/8	-3.8
N	ELECTRONIC OATA SYS.	16- 19	16 3/4	- 1/4	-1.4
O	INSYTE CORP	2- 3	1 3/4	0	0.0
O	IPS COMPUTER MARRET.	1- 2	1 1/2	0	0.0
O	REANE ASSOCIATES	3- 4	3 3/4	- 1/4	-6.2
O	REYOATA CORP	2- 3	2 3/8	+ 1/8	+3.5
A	LOGICON	7- 16	12 1/8	- 7/8	-6.7
A	MANAGEMENT OATA	1- 2	1 1/4	0	0.0
A	NATIONAL CSS INC	19- 23	19 7/8	- 7/8	-4.2
O	NATIONAL OATA COMP	4- 7	4 3/8	- 1/4	-5.4
A	ON LINE SYSTEMS INC	17- 22	17	0	0.0
N	PLANNING RESEARCH	3- 5	3 1/2	0	0.0
O	PROGRAMMING & SYS	1- 1	3/8	0	0.0
O	RAPIOATA INC	2- 3	2	0	0.0
O	REYNOLDS & REYNOLO	17- 20	17 1/4	- 1/4	-1.4
O	SCIENTIFIC COMPUTERS	1- 3	3 1/2	0	0.0
O	TYMSHARE INC	14- 20	17	+ 1/4	+1.4
A	URS SYSTEMS	4- 5	4 3/4	0	0.0
N	NYLY CORP	1- 2	1 1/2	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOORESSOGRAPH-MULT	10- 14	12 1/4	+1	+8.8
O	AOVANCEO MEMORY SYS	7- 9	7 7/8	- 1/8	-1.5
N	AMPER CORP	8- 9	8	- 1/8	-1.3
O	ANDERSON JACOBSON	3- 4	3 3/8	- 1/8	-3.5
N	APPLIEO OIG DATA SYS	10- 16	12 7/8	+1 7/8	+17.0
O	BEEHIVE INT'L	9- 12	8 3/4	+ 1/4	+2.9
A	BOLT,BERANEK & NEW	7- 8	A 5/8	- 1/8	-1.8
N	BUNRER-RAMO	8- 12	9 1/2	+ 1/8	+1.3
A	CALCOMP	3- 5	2 3/4	0	0.0
O	CAMBRIDGE MEMORIES	1- 3	2 1/2	+ 1/8	+5.2
N	CENTRONICS DATA COMP	22- 28	27	+2 1/8	+8.5
O	CODER CORP	31- 47	43	-3 1/4	-7.0
O	COGNITRONICS	1- 1	3/4	0	0.0
O	COMPUTER COMMUN.	5- 6	5 7/8	+ 1/8	+2.1
O	COMPUTER CONSOLES	4- 7	5 3/4	- 1/4	-4.1
A	COMPUTER EQUIPMENT	2- 3	3 1/8	0	0.0
O	COMPUTER TRANSCEIVER	1- 1	1 1/8	0	0.0
O	COMTEN	9- 13	9 1/4	-1 1/8	-10.8
N	CONRAC CORP	21- 28	21 3/4	-4 5/8	-17.5
O	OATA ACCESS SYSTEMS	4- 5	4 1/2	0	0.0
O	OATA 100	6- 8	6 1/2	+ 1/8	+1.9
A	OATA PRODUCTS CORP	9- 13	10 3/4	+ 3/4	+7.3
O	OATA TECHNOLOGY	3- 4	3 3/4	0	0.0
O	OATUN INC	1- 2	1 1/2	0	0.0
O	DECISION OATA COMPUT	2- 2	1 1/2	0	0.0
O	OELTA OATA SYSTEMS	1- 1	3/8	0	0.0
N	ELECTRONIC M & M	4- 5	3 3/8	- 3/8	-9.3
O	PABRI-TEK	1- 2	7/8	0	0.0
O	GENERAL COMPUTER SYS	0- 2	1 5/8	+ 1/4	+18.1
N	HAZELTINE CORP	9- 12	9 3/8	0	0.0
N	HARRIS CORP	28- 39	37 7/8	+ 1/2	+1.3
A	INCOTERN CORP	11- 13	11	- 3/8	-3.2
O	INFOREX INC	4- 7	4	- 1/8	-3.0
O	INFORMATION INTL INC	11- 14	10 3/4	- 1/2	-4.4
O	INTEL CORP	38- 57	43	0	0.0
A	LUNDY ELECTRONICS	3- 6	4	0	0.0
O	MSI OATA CORP	6- 8	7 1/4	- 1/4	-3.3
N	MOHAWK OATA SCI	5- 8	4 7/8	0	0.0
O	PENRIL CORP	2- 5	4 1/2	0	0.0
A	PERTEC CORP	7- 9	6 3/4	+ 1/4	+3.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	4	- 3/8	-8.3
O	RECOGNITION EQUIP	A- 10	6 3/8	- 1/4	-3.7
O	SCAN OATA	1- 2	1 5/8	+ 1/8	+12.5
O	STORAGE TECHNOLOGY	10- 13	12 5/8	+1 1/4	+10.9
O	T BAR INC	7- 10	9	+ 1/8	+1.4
O	TALLY CORP.	4- A	4 5/8	- 1/8	-2.6
O	TEC INC	7- 10	8 1/4	+ 1/4	+3.1
N	TERTRONIX INC	29- 34	33 5/8	0	0.0
N	TELEX	2- 3	2 1/2	+ 1/8	+5.2
O	WILTEK INC	1- 1	1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1977 RANGE (1)	CLOSE JUNE 1 1977	NEER NET CHNGE	WEER PCT CHNGE
O	BALTIMORE BUS FORMS	2- 4	1 7/8	0	0.0
A	BARRY WRIGHT	10- 14	11 5/8	- 1/4	-2.1
O	CYBERMATICS INC	1- 1	1/2	0	0.0
O	DUPLEX PRODUCTS INC	14- 18	16 1/2	+ 1/4	+1.5
N	ENNIS BUS. FORMS	6- 7	3 7/8	0	0.0
O	GRAHAM MAGNETICS	11- 14	13	- 1/4	-1.8
O	GRAPHIC CONTROLS	15- 18	16 3/4	- 1/4	-1.4
N	3M COMPANY	48- 56	48 7/8	+ 3/8	+0.7
O	MOORE CORP LTD	30- 37	30	0	0.0
N	NASHUA CORP	16- 22	19 3/4	+ 1/4	+1.2
O	STANOARD REGISTER	18- 24	23 1/4	+ 1/2	+2.1
O	TAB PRODUCTS CO	13- 17	15 3/4	0	0.0
N	UARCO	19- 22	19 7/8	- 3/8	-1.8
A	WABASH MAGNETICS	10- 15	13 3/8	+ 1/4	+1.9
N	WALLACE BUS FORMS	17- 21	17 1/2	- 1/2	-2.7

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